Williams®
ELECTRONICS GAMES, INC.

March 1993
16-50001-101

BRAM STOKER'S
Dracula™

OPERATIONS MANUAL

Operations & Adjustments
Testing & Problem Diagnosis
Parts Information
Wiring Diagrams & Schematics

Williams Electronics Games, Inc.
3401 N.California
Chicago, Il 60618

This scan of Bram Stokers Dracula pinball manual is available for FREE off the internet.

Jumper Charts

Display	W1	W2
1M/2M/4M ROM	In	Out
512K/1M ROM	Out	In

Country	W14	W15	W16	W17	W18
American	In	In	In	In	In
European	In	In	Out	In	In
French	In	In	In	Out	Out
German	In	In	In	In	Out
Spanish	In	Out	In	In	In

SOLENOID / FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive xistor	Drive Connections			Drive Wire Color	Solenoid Part Number Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	Shooter	High Power	J107-3			Q82	J130-1			Vio-Brn	AE-23-800	
02	Coffin Popper	High Power	J107-3			Q80	J130-2			Vio-Red	AE-24-900	
03	Castle Popper	High Power	J107-3			Q78	J130-4			Vio-Org	AE-26-1500	
04	Right Ramp Down	High Power	J107-3			Q76	J130-5			Vio-Yel	AE-26-1200	
05	Crypt Popper	High Power	J107-3			Q64	J130-6			Vio-Grn	AE-26-1500	
06	Wire Ramp Ball Popper	High Power	J107-3			Q66	J130-7			Vio-Blu	AE-23-800	
07	Knocker	High Power	J107-3			Q68	J130-8			Vio-Blk	AE-23-800	
08	Shooter Ramp Entry	High Power	J107-3			Q70	J130-9			Vio-Gry	AE-26-1500	
09	Left Sling	Low Power	J107-2			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Right Sling	Low Power	J107-2			Q56	J127-3			Brn-Red	AE-26-1200	
11	Left Jet	Low Power	J107-2			Q54	J127-4			Brn-Org	AE-26-1200	
12	Right Jet	Low Power	J107-2			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Bottom Jet	Low Power	J107-2			Q50	J127-6			Brn-Grn	AE-26-1200	
14	Right Ramp Up	Low Power	J107-2			Q48	J127-7			Brn-Blu	SM1-28-900	
15	Outhole	Low Power	J107-2			Q46	J127-8			Brn-Vio	AE-27-1200	
16	Trough	Low Power	J107-2			Q44	J127-9			Brn-Gry	AE-26-1200	
17	T.R Corner / Dracula FL	Flasher	J107-6	J106-5		Q42	J126-1	J125-1		Blk-Brn	(3) #906	(1) #906
18	Jackpot / Stoker FL	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	(1) #906	(1) #906
19	3-bank / House FL	Flasher	J107-6	J106-5		Q38	J126-3	J125-3		Blk-Org	(1) #89	(1) #906
20	T.L. Corner / Mina FL	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	(1)#89,(1)#906	(1) #906
21	Castle / Helsing FL	Flasher	J107-6	J106-5		Q28	J126-5	J125-6		Blu-Grn	(2) #89	(1) #906
22	L. Ramp / L. Logo FL	Flasher	J107-6	J106-5		Q30	J126-6	J125-7		Blu-Blk	(1) #906	(1) #906
23	R. Ramp / R. Logo FL	Flasher	J107-6	J106-5		Q34	J126-7	J125-8		Blu-Vio	(1) #906	(1) #906
24	Asylum / Renfield FL	Flasher	J107-6	J106-5		Q32	J126-8	J125-9		Blu-Gry	(1) #89	(1) #906
25	L. Drop Target	Low Power	J107-1			Q26	*J122-1			Blu-Brn	AE-26-1200	
26	Speaker Panel FL	Low Power		J106-5		Q24		J128-2		Blu-Red		(3) #906
27	Magnet	Low Power	J107-1			Q22	*J122-3			Blu-Org	20-9831	
28	Magnet's Motor	Low Power	J107-6			Q20	J122-4			Blu-Yel	14-7981	
	General Illumination		**Playfield**	**Backbox**	**Cabinet**		**Playfield**	**Backbox**	**Cabinet**		**Playfield**	**Backbox**
01	Lower Playfield / Insert	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#555	#555
02	Upper Playfield / Insert	G.I.	J121-2	J120-2		Q10	J121-8	J120-8		Wht-Org	#555	#555
03	Center Playfield / Insert	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#555	#555
04	Insert	G.I.		J120-5		Q16		J120-10		Wht-Grn	#555	#555
05	Insert	G.I.		J120-6	J119-3	Q12		J120-11	J119-1	Wht-Vio	#555	#555
	Flipper Circuits		**Playfield**		Power	Hold	**Playfield**		Power	Hold		
	Lower Left Flipper	Flipper	J907-6,7 (Gry-Yel)		Q3	Q9	J902-7,9		Blu-Gry	Org-Blu	FL-15411	
	Lower Right Flipper	Flipper	J907-8,9 (Blu-Yel)		Q4	Q11	J902-11,13		Blu-Vio	Org-Grn	FL-15411	
33	Up/Down Post Diverter	Up Lt. F. Power	J907-2		Q1		J902-3		Blk-Blu		AE-26-1500	
34	Right Gate	Up Lt. F. Hold	J907-1			Q5	J902-1			Org-Gry	AE-26-1500	
35	Dis. Castle Release Pst	Up Rt. F. Power	J907-5		Q2		J902-6		Blk-Yel		AE-26-1500	
36	Left Ball Gate Actuator	Up Rt. F. Hold	J907-4			Q7	J902-4			Org-Vio	A-14406	

* J122-1, 3 have tieback diodes at J122-5, 8 respectively.

Bram Stoker's
Dracula™

Love never dies.

Williams Electronics Games, Inc. reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

Dracula Game Story

The Movie

The game is based on the new Francis Ford Coppola movie *Dracula* which is based on the original story by Bram Stoker. Coppola has created such blockbuster movies as *The Godfather I, II & III* and *Apocalypse Now.*

The story begins with the Romanian Prince Vlad and his armies waging war against the Turks. He returns from battle only to find his beloved Elizabeth lying dead in a pool of blood. She had received a deceitful letter stating that Prince Vlad had been killed in battle, so she flung herself from the castle turret.

Dracula renounces God and vows to avenge her death with "All the powers of darkness", then drinks a cup of her blood.

The story goes on with Dracula going through various transformations from a young man to an old man, a wolf, a bat, and also a green mist.

The main story line is Dracula trying to win the hand of Mina, whom he thinks is the reincarnation of Elizabeth, and the battles he must do with Van Helsing, the 'Vampire Killer' who is trying to destroy him.

Dracula is a MUST SEE movie which opens in the United States November 13th, 1992. Yes, that's Friday the 13th. What good timing.

The Game

The game designer tried to follow the story line as closely as possible with the features on this game. At the very top of the playfield is the entrance to 'Video Mode' which simulates 'wolves' being hunted in the graveyard. The left side represents the 'Carfax Abby', Dracula's manor house in London. The right side is 'Dracula's Castle' in Romania. The shot under the right ramp leads into a 'coffin', plus there are many more movie tie-ins. My favorite feature is the 'green mist'. When certain shots are made a ball is transported across the playfield by means of a magnet under the board. A light also moves in unison with the magnet. The playfield art in that area is a 'mist' and when the light and ball move it seems that the ball is floating in the 'mist'.

Table Of Contents

Rules & Shot Maps .... a-j

Section 1 - Game Operation & Test Information

(System WPC) ROM Summary 1-1
Pinball Game Assembly Instructions 1-2
    Pinball Assembly, Playfield Pitch Angle, & Leg Leveler Detail 1-2
Raising the Playfield 1-4
Game Control Locations 1-5
Game Operation 1-6
Menu System Operation & Main Menu 1-7
    Bookkeeping Menu 1-8
        B.1 Main Audits 1-8
        B.2 Earnings Audits 1-8
        B.3 Standard Audits 1-9
        B.4 Feature Audits 1-10
        B.5 Histograms 1-11
        B.6 Time-Stamps 1-11
    Printouts Menu 1-12
    Test Menu 1-13
        T.1 Switch Edges 1-13
        T.2 Switch Levels 1-13
        T.3 Single Switches 1-13
        T.4 Solenoid Test 1-14
        T.5 Flasher Test 1-14
        T.6 General Illumination Test 1-14
        T.7 Sound & Music Test 1-15
        T.8 Single Lamp Test 1-15
        T.9 All Lamp Test 1-15
        T.10 Lamp & Flasher Test 1-15
        T.11 Display Test 1-15
        T.12 Flipper Coil Test 1-16
        T.13 Ordered Lamps Test 1-16
        T.14 Top Right Ramp Test 1-16
        T.15 Magnet Test 1-17
    Utilities Menu 1-18
        U.1 Clear Audits 1-18
        U.2 Clear Coins 1-18
        U.3 Reset H.S.T.D. 1-18
        U.4 Set Time & Date 1-18
        U.5 Custom Message 1-18
        U.6 Set Game I.D. 1-19
        U.7 Factory Adjustment 1-19
        U.8 Factory Reset 1-19
        U.9 Preset 1-19
            Difficulty Setting Table for U.S., Canadian & French Games 1-20
            Difficulty Setting Table for German & European Games 1-21
            Preset Adjustments Table for U.S. & Canadian Games 1-22
            Preset Adjustments Table for German Games 1-24
            Preset Adjusıments Table for French Games 1-24
        U.10 Clear Credits 1-24
        U.11 Auto Burn-in 1-24
    Adjustment Menu 1-25
        A.1 Standard Adjustments 1-25
        A.2 Feature Adjustments 1-29
        A.3 Pricing Adjustments 1-34
            Pricing Table 1-36

Copyright 1993 Williams Electronics Games, Inc.

Section One - Game Operation & Test Information Continued...

A.4 H.S.T.D. Adjustments....1-37
A.5 Printer Adjustments....1-38
Error Messages....1-39
CPU Board LED Error Codes....1-41
Sound Board Beep Error Codes....1-41
LED List....1-42
Fuse List....1-43
Maintenance Information....1-44
Lubrication....1-44
Switch Contacts....1-44
Cleaning....1-44
Magnet and the Long Beam Opto Switch....1-45
Magnet and the Short Beam Opto Switches....1-45

Section 2 - Game Parts Information

Line Filter/Cordset Application Chart....2-2
Cabinet Parts....2-3
Backbox Assembly....2-4
Fliptronic II Board....2-5
Audio Board....2-6
CPU Board....2-8
Power Driver Board....2-10
Dot Matrix Controller Assembly....2-12
Coin Door Interface Board....2-14
Double Flipper Opto Board....2-15
10 Switch-Opto Assembly....2-16
24-Opto Assembly....2-17
High Current Driver Assembly, Motor EMI Board....2-18
Jet Bumper Assembly....2-19
Electronic Flipper Assemblies....2-20
Outhole Kicker Assembly....2-22
Ball Shooter Lane Feeder....2-23
Kicker Arm (slingshot) Assembly....2-24
1-bank Drop Target....2-25
Lift Ramp Assembly....2-26
Coil Magnet & Screw Assembly....2-27
Coffin, Crypt, Castle & Wire Ramp Ball Popper Assemblies....2-28
Entry Ramp Mechanism Assembly....2-30
Motor Ramp Assembly....2-31
Up/Down Post Assembly....2-32
Coffin Plate Assembly, Coil & Bracket Assembly....2-33
Disappearing Post Assembly, Ball Gate Actuator Assembly....2-34
Kicker Bracket Assembly, Knocker Assembly....2-35
Metal & Plastic Posts....2-36
Switch & Plate Assembly, Tilt Mechanism Assembly....2-38
Back Panel Assembly....2-39
Coin Door Assembly....2-40
Upper Playfield Parts Location....2-42
Lower Playfield Parts Location....2-43
Lamp Location....2-44
Solenoid/Flasher Location....2-45
Switch Location....2-46
Rubber Parts Location....2-47
Ramp Location....2-48
Unique Parts List, Cable List....2-49

Section 3 - Schematics, Wiring Diagrams & Circuit Theory

Connector & Component Identification....3-1
Lamp Matrix....3-2
Lamp Circuit....3-3
Switch Matrix....3-4
Switch Matrix Circuit....3-5
Dedicated Switches....3-6
Dedicated Switch Circuit....3-7
Solenoid Table....3-8
Flashlamp Wiring....3-9
Solenoid Wiring....3-10
High Power Solenoid Circuit....3-12
Low Power Solenoid Circuit....3-13
Flashlamp Circuit....3-14
Special (General Purpose) Solenoid Circuit....3-15
General Illumination Circuit....3-16
Fliptronic II Flipper Circuit Diagram....3-17
Fliptronic II Flipper Circuits....3-18
Fliptronic II Flipper Cabinet Switch Circuit Diagram....3-19
Fliptronic II Flipper Cabinet Switches....3-20
Fliptronic II Flipper End-of-Stroke Switches....3-21
10 Sw.-Opto Board Assembly....3-22
10 Sw.-Opto Board Schematic....3-23
24-Opto Assembly & Schematic....3-24
10 Sw.-Opto Circuit, 24-Opto Circuit....3-25
High Current Driver Board Assy & Schematic, Motor EMI Board Assy & Schematic....3-26
Motor / Magnet Circuit....3-27
Audio Board Interboard Wiring, Speaker Wiring....3-28
Dot Matrix Controller Board Interboard Wiring....3-29
Coin Door Interface Board Interboard Wiring....3-30
Coin Door Interface Board Schematic....3-31
CPU Board Interboard Wiring....3-32
Fliptronic II Board Interboard Wiring....3-33
Fliptronic II Opto Switch Board Interboard Wiring & Schematic....3-34
Power Driver Board Interboard Wiring....3-35

NOTES

Dracula...the Rules and Shot Maps

Skill Shot

Try to time hitting the top left drop targets with the three 'gargoyles' on the back panel. The left face scores 500K and the right face scores 100K. The center face advances V-I-D-E-O, scores 1 Million and increases up to 5 Million maximum.

V-I-D-E-O and 'Video Mode'

Making V-I-D-E-O shot scores 100K - 500K - 1 Million - 3 Million - 5 Million and 'Video Mode Lit'. Entering the hole behind the drop target starts 'Video Mode' when lit. During 'Video Mode', 'werewolves' will be coming at you from the left or the right or both. Use the flipper buttons to fire each shot, either left or right, but use your shots sparingly because you only have five more bullets than there are 'werewolves'. The closer the 'werewolves' are the more they are worth. Successfully destroying all of them scores 5 Million - 10 Million - 15 Million - 20 Million - 25 Million maximum. Plus, there is a bonus for each unused bullet; five bullets left=10 Million, four bullets left=5 Million, three bullets left=1 Million, two bullets left=500K, one bullet left=100K.

3-banks and 'Castle' Multiball

Making either 3-bank by first hitting the two outside targets, then hitting the flashing center target turns On the Castle Lock light for a timed period. Making shot up the left ramp will now lock ball in the 'castle'. Repeat for 3 locks, then 'Castle' Multiball starts, (you will be given credit for each ball that you lock, even if someone else releases the balls). During 'Castle' Multiball, 'Castle' Jackpot is scored by entering the 'tunnel' above the left jet bumper after you re-lock a ball into the 'castle'. 'Castle' Jackpot values are 15 Million - 25 Million - 35 Million - 50 Million and are increased by the jet bumpers.

Right Ramp and 'Coffin' Multiball

Consecutive shots up the right ramp score and advance lit value - 500K - 1 Million - 1.5 Million - 2 Million - 2.5 Million. Left return lane when lit lights ramp for double value. After scoring 2.5 Million, ramp lifts to enable locking balls in 'coffin' (balls do not actually lock in 'coffin', but you are given credit for them). After 3rd ball is locked, start 'Coffin' Multiball. Spell D-R-A-C-U-L-A to collect 'Coffin' Jackpot - 20 Million - 30 Million - 40 Million - 50 Million with two balls in play and 40 Million - 60 Million - 80 Million - 100 Million with three balls in play. Spot letters on 'Coffin' Shot.

Left Ramp and 'Mist' Multiball and Extra Ball

Making required number of shots (see score display) up left ramp lights Extra Ball, lights 'Mist' Multiball and starts 'Bat' Mode. Extra Ball is lit on the hole above the left jet bumper. Enter the hole, when lit, and a ball will mysteriously move across the playfield floating above the 'green mist'. Use your ball to try and hit the moving ball to free it. If you do, start 'Mist' Multiball, all ramps and tunnels are worth 10 Million each and all targets score 250K. During 'Bat' Mode, wake all 'bats' by hitting targets within time limit. Value starts at 50 Million decreasing down to 2 Million.

Multi - Multiball

During any multiball you have the opportunity to start a second or third multiball at the same time. If two multiball features are in play, all jackpots score 2X. If all three are in play, all jackpots score 3X.

Dungeon Shot, Rats and Specials

Making required number of shots into 'Dungeon' starts 'Rat' Mode or lights outlane for Extra Ball and Special. During 'Rat' Mode, try and destroy as many 'rats' as possible during timed interval. The 'rat' value and bonus increases with each target you hit.

The 'Asylum'

The 'Asylum', where 'Renfield' is kept prisoner, is located just above the left 3-bank. Falling into the 'Asylum' scores 5 Million.

? Mystery

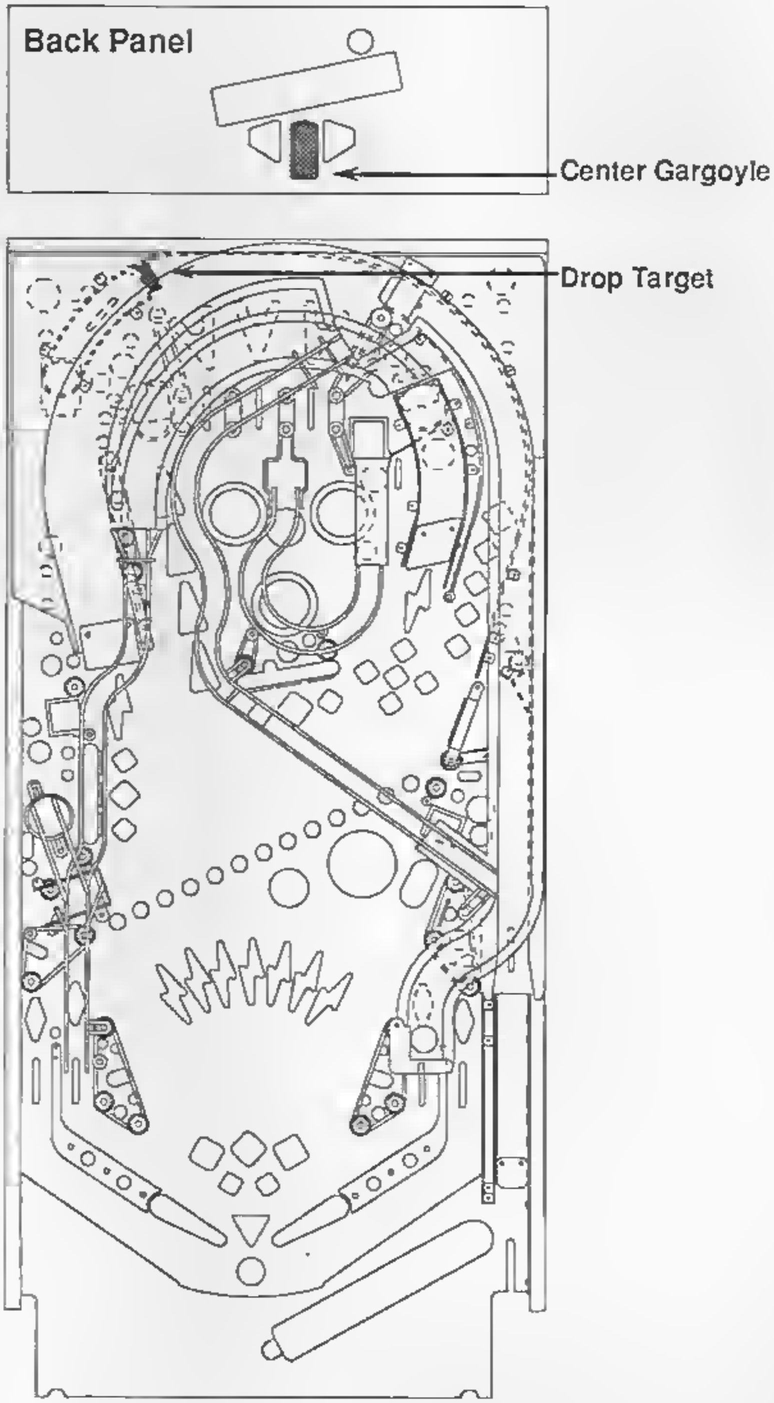
Right return lane lights left tunnel for Mystery Score - Extra Ball, Points, Locks, Video Mode, Bonus X, etc.

Bonus 'X'

The three top lanes advance the Bonus Multiplier.

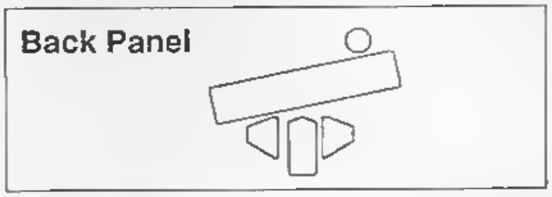
Skill Shot

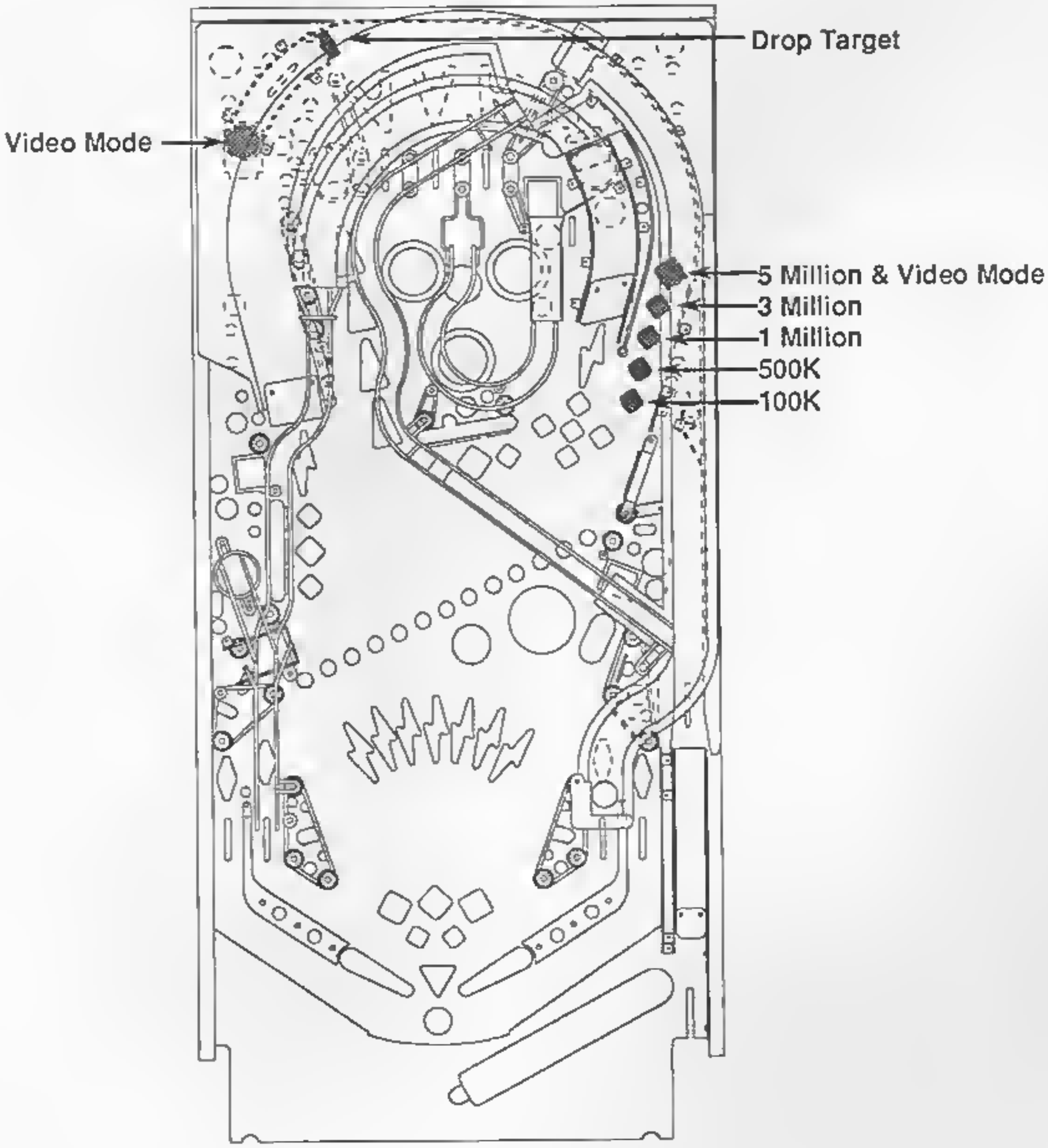
Try to time the top left drop targets with the three 'gargoyles' on the back panel. The left face scores 500K and the right face scores 100K. The center face advances V-I-D-E-O, scores 1 Million and increases up to 5 Million maximum.


Back Panel
Center Gargoyle
Drop Target

V-I-D-E-O and 'Video Mode'

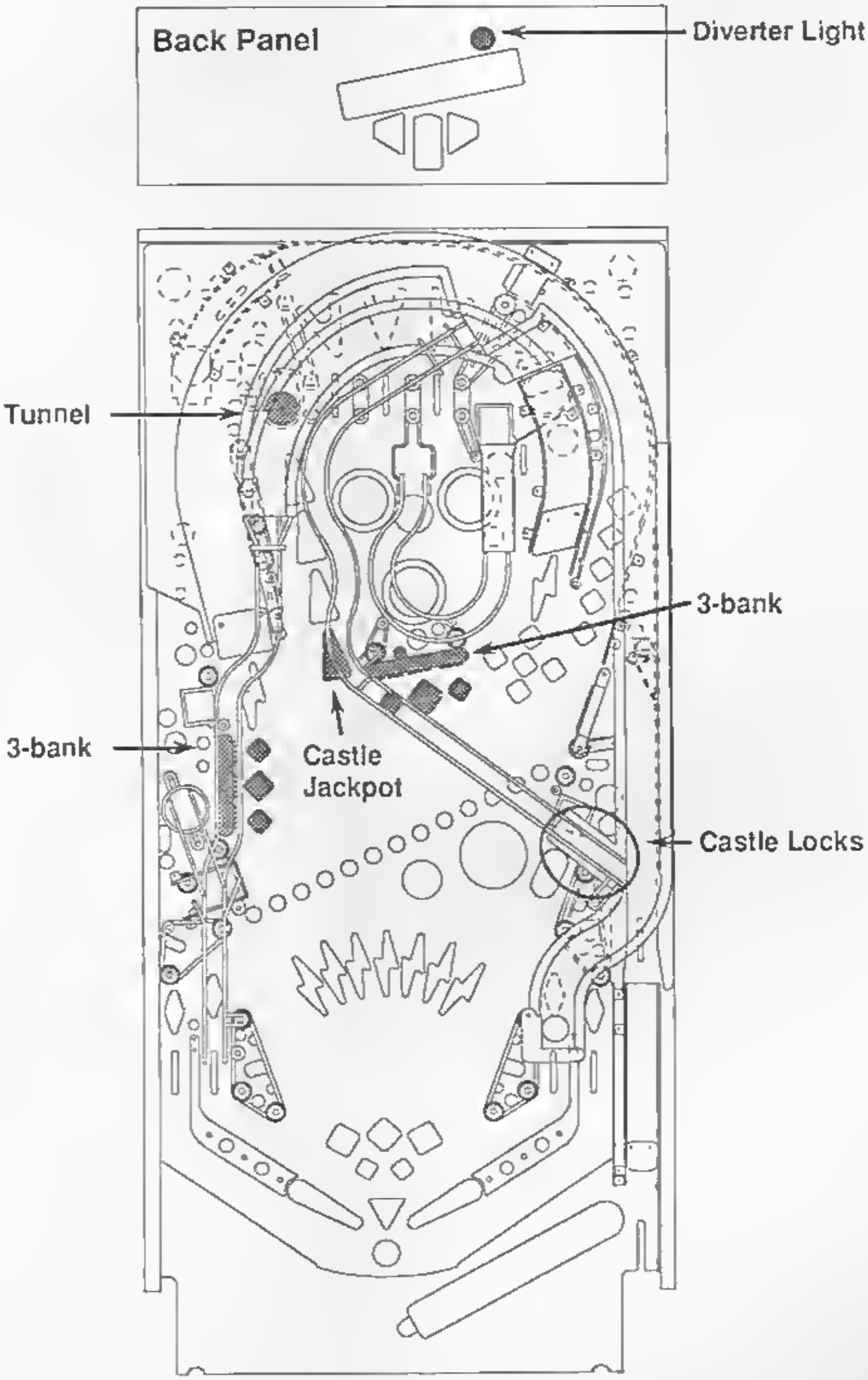
Making V-I-D-E-O shot scores 100K - 500K - 1 Million - 3 Million - 5 Million and 'Video Mode Lit'. Entering the hole behind the drop targets starts 'Video Mode', 'werewolves' will be coming at you from the left or right or both. Use the flipper buttons to fire each shot, either left or right, but use your shots sparingly because you only have five more shots than there are 'werewolves'. The closer the 'werewolves' are the more they are worth. Successfully destroying all of them scores 5 Million - 10 Million - 15 Million - 20 Million - 25 Million maximum. Plus, there is a bonus for each unused bullet; five bullets left = 10 Million, four bullets left = 5 Million, three bullets left = 1 Million, two bullets left = 500K, one bullet left = 100K.




Drop Target
Video Mode
5 Million & Video Mode
3 Million
1 Million
500K
100K

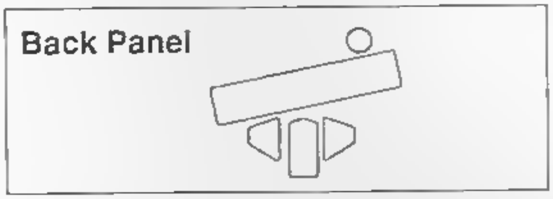
3-bank and 'Castle' Multiball

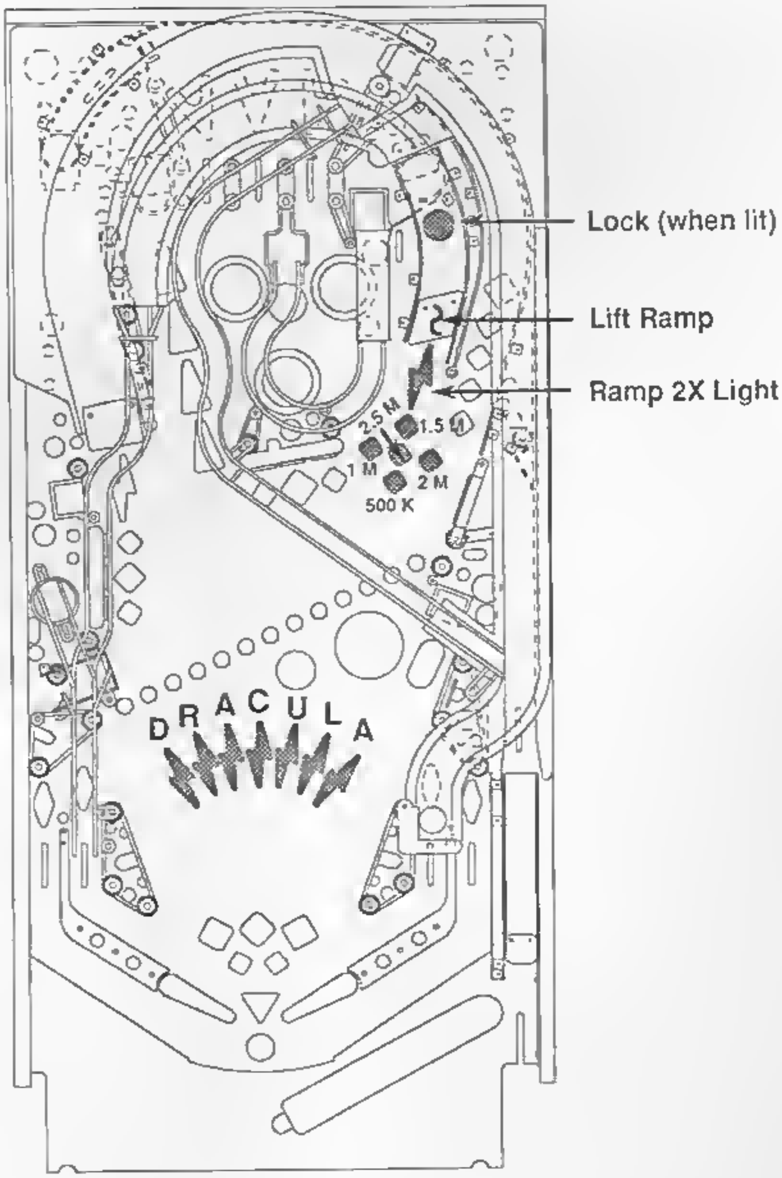
Making either 3-bank by first hitting the two outside targets, then hitting the flashing center target turns On the Castle Lock light for a timed period. Making shot up the left ramp will now lock ball in the 'castle'. Repeat for 3 locks, then 'Castle' Multiball starts, (you will be given credit for each ball that you lock, even if someone else releases the balls). During 'Castle' Multiball, 'Castle' Jackpot values are 15 Million - 25 Million - 35 Million - 50 Million and are increased by the jet bumpers.


Back Panel
Diverter Light
Tunnel
3-bank
3-bank
Castle Jackpot
Castle Locks

Right Ramp and 'Coffin' Multiball

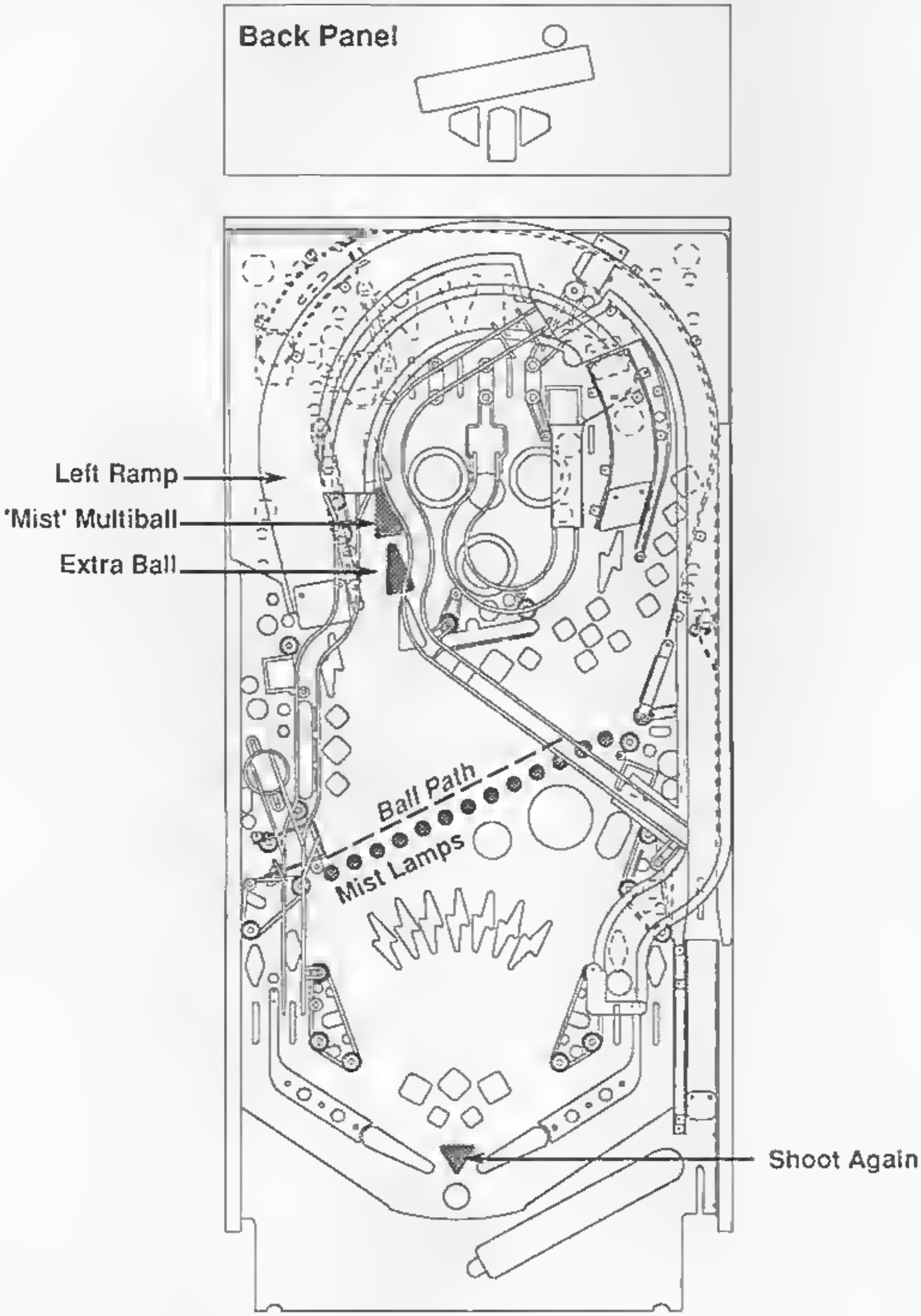
Consecutive shots up the right ramp score and advance lit value - 500K - 1 Million - 1.5 Million - 2 Million - 2.5 Million. Left return lane when lit lights ramp for double value. After scoring 2.5 Million, ramp lifts to enable locking balls in 'coffin' (balls do not actually lock in 'coffin', but you are given credit for them). After 3rd ball is locked, start 'Coffin' Multiball. Spell D-R-A-C-U-L-A to collect 'Coffin' Jackpot - 20 Million - 30 Million - 40 Million - 50 Million - with two balls in play and - 40 Million - 60 Million - 80 Million - 100 Million with three balls. Spot letters on 'Coffin' Shot.




Lock (when lit)
Lift Ramp
Ramp 2X Light
2.5 M
1.5 M
1 M
2 M
500 K
D
R
A
C
U
L
A

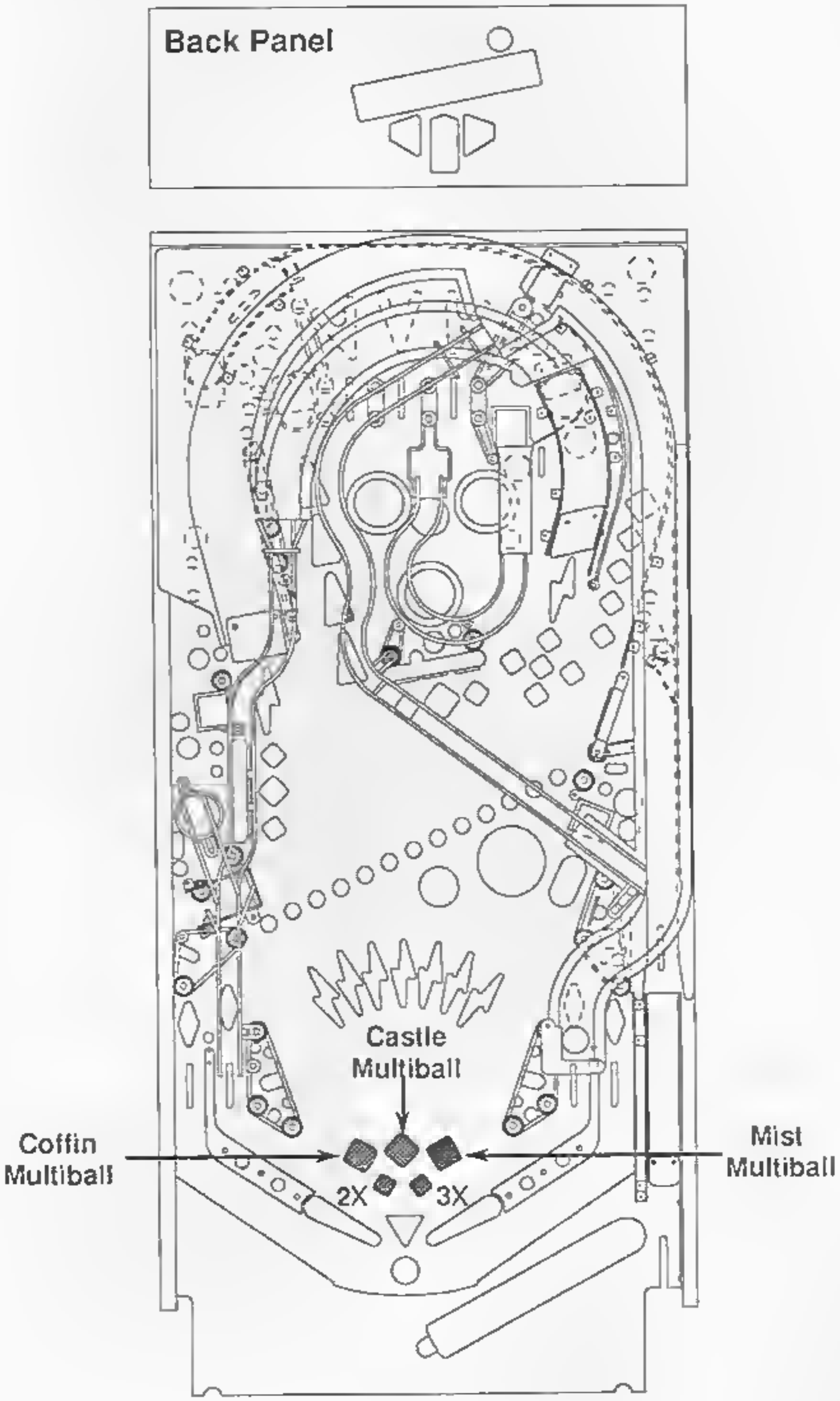
Left Ramp and 'Mist' Multiball and Extra Ball

Making required number of shots (see score display) up left ramp lights Extra Ball, lights 'Mist' Multiball and starts 'Bat' Mode. Extra Ball is lit on the hole above the left jet bumper. Enter the hole, when lit, and a ball will mysteriously move across the playfield floating above the 'green mist'. Use your ball to try and hit the moving ball to free it. If you do, start 'Mist' Multiball, all ramps and tunnels are worth 10 Million each and all targets score 250K. During 'Bat' Mode, wake all 'bats' by hitting targets within time limit. Value starts at 50 Million decreasing down to 2 Million.


Back Panel
Left Ramp
'Mist' Multiball
Extra Ball
Ball Path
Mist Lamps
Shoot Again

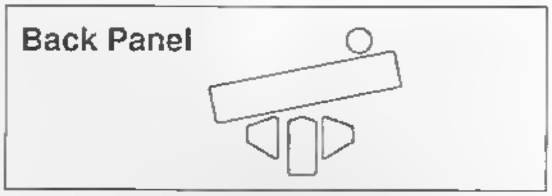
Multi - Multiball

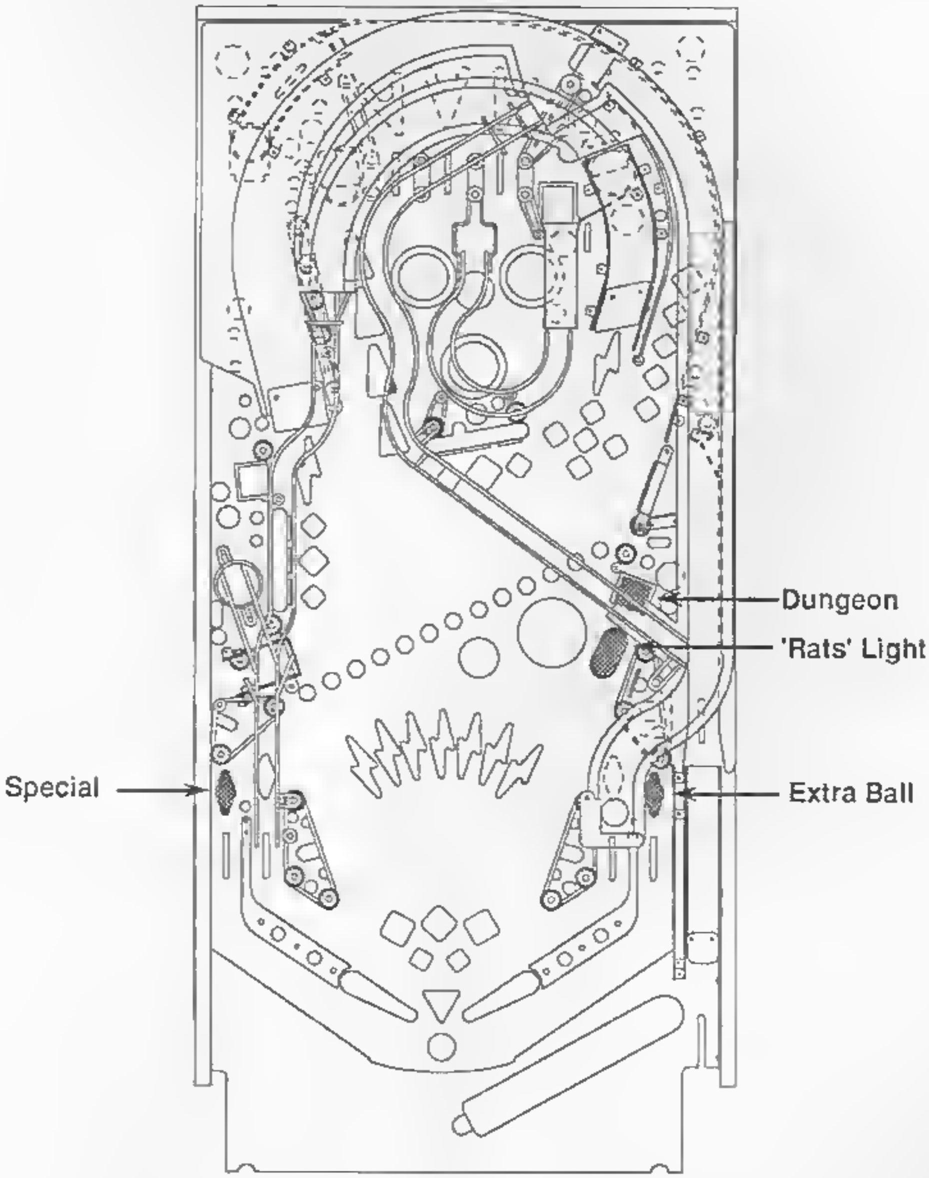
During any multiball you have the opportunity to start a second or third multiball at the same time. If two multiball features are in play, all jackpots score 2X. If all three are in play, all jackpots score 3X.


Back Panel
Castle Multiball
Coffin Multiball
Mist Multiball
2X
3X

Dungeon Shot, Rats and Specials

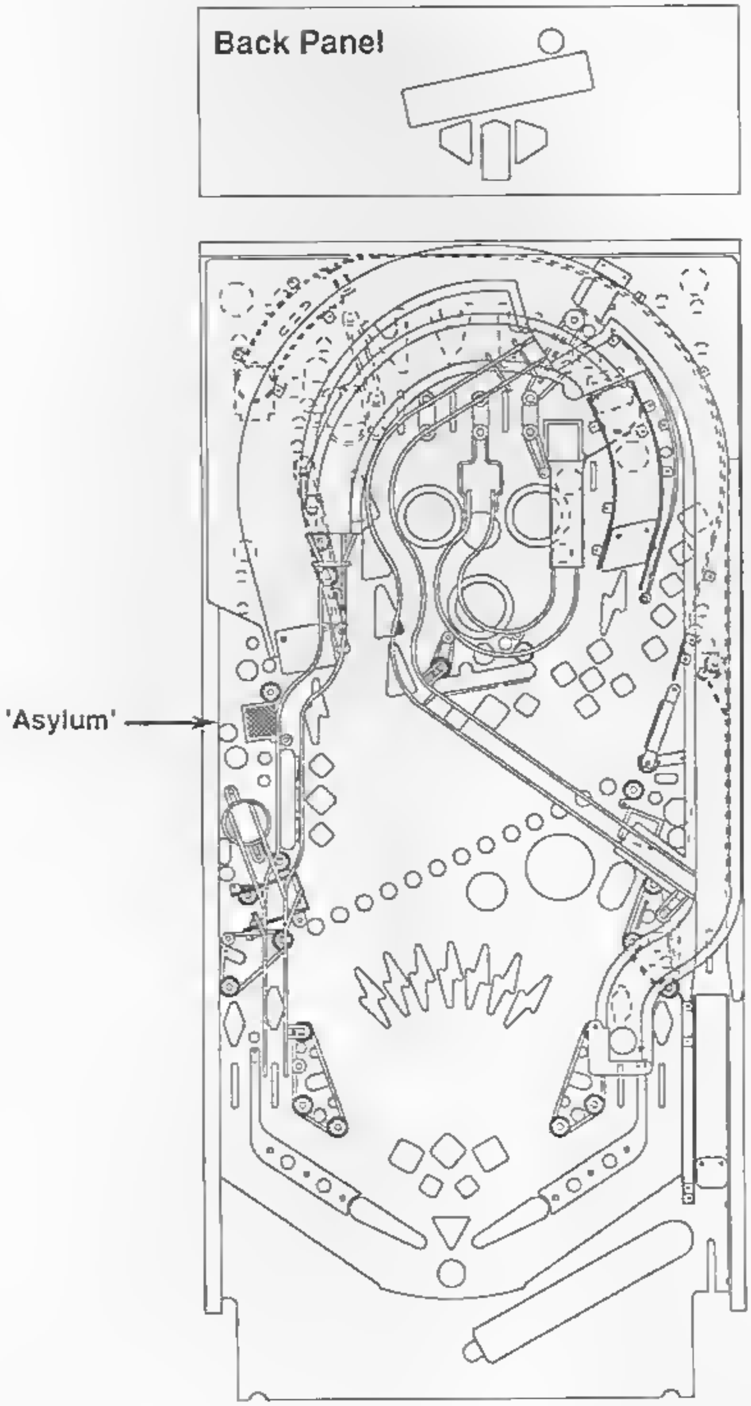
Making required number of shots into 'Dungeon' starts 'Rat' Mode or lights outlane for Extra Ball and Special. During 'Rat' Mode, try and destroy as many 'rats' as possible during timed interval. The 'rat' value and bonus increases with each target you hit.




Dungeon
'Rats' Light
Special
Extra Ball

The 'Asylum'

The 'Asylum', where 'Renfield' is kept prisoner, is located just above the 3-bank. Falling into the 'Asylum' scores 5 Million.

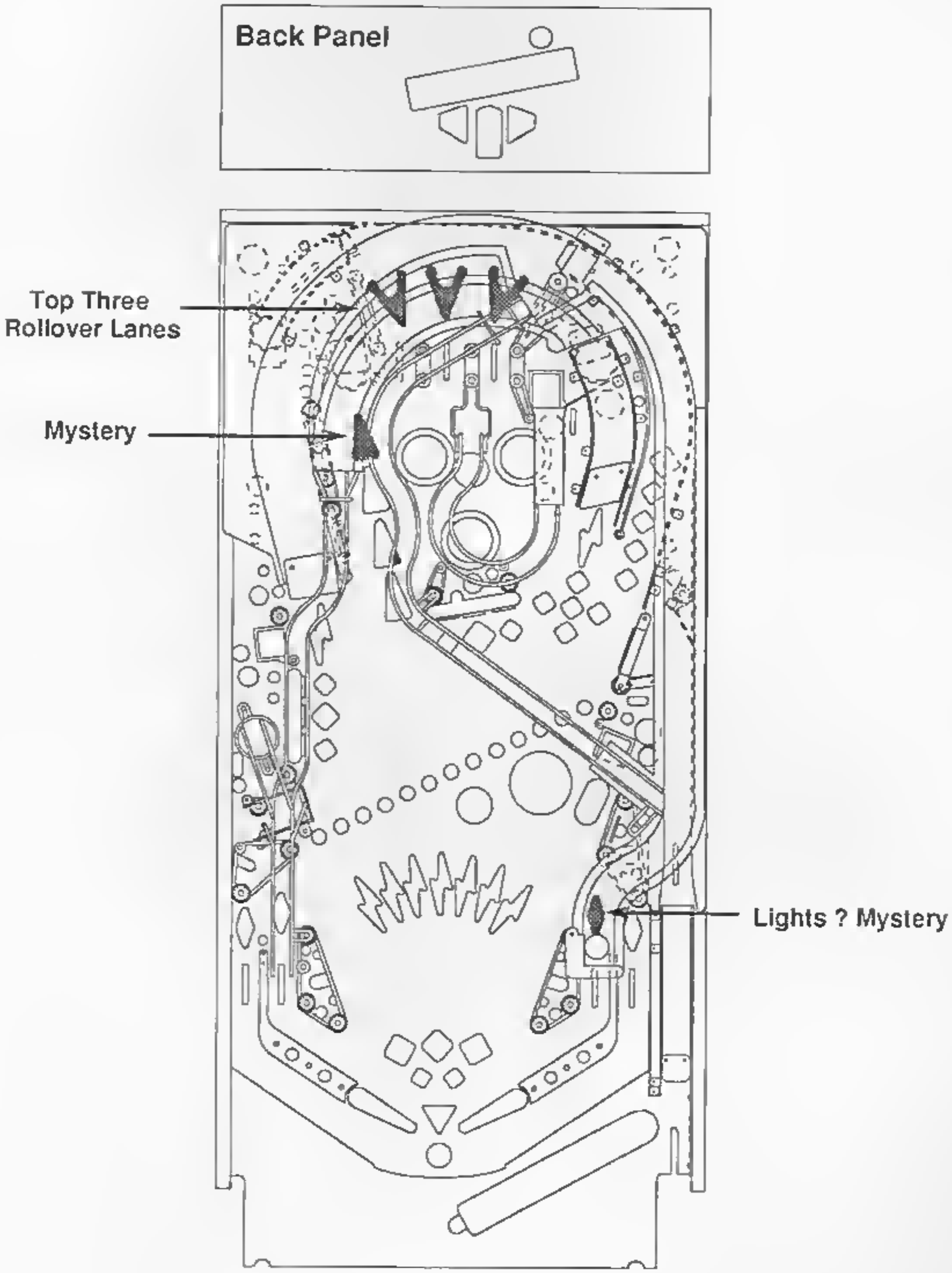

Back Panel
'Asylum'

? Mystery

Right return lane lights left tunnel for Mystery Score - Extra Ball, Points, Locks, Video Mode, Bonus X, etc.

Bonus 'X'

The top three rollover lanes advance Bonus Multiplier.


Back Panel
Top Three Rollover Lanes
Mystery
Lights ? Mystery

Section 1

Game
Operation
&
Test
Information

ROM SUMMARY

IC	Type	Location	Board	Part Number
Game ROM 1	27c040	U6	CPU	A-5343-50001-1
Music/Speech ROM	27c020	U15	Audio	A-5343-50001-3
Music/Speech ROM	27c010	U18	Audio	A-5343-50001-4

PINBALL GAME ASSEMBLY INSTRUCTIONS

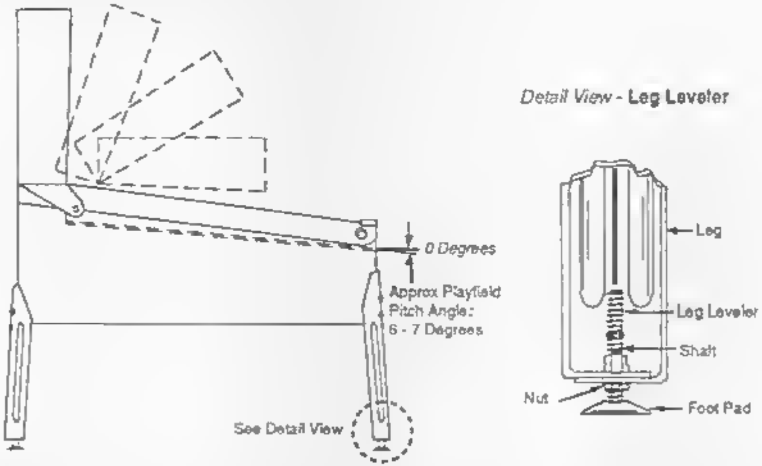
Dracula IS A 4 BALL GAME

Power:	Domestic 120V @ 60Hz Foreign 230V @ 50Hz Japan 100V @ 50HZ	***Dimensions:***	Width: 26" approx. Depth: 56" approx. Height: 85" approx.
Temp:	32°F to 100° F (0°C to 38°)C	***Weight:***	285 lbs approx. (crated)
Humidity:	Not to exceed 95% relative.		

1. Remove all cartons, parts, and other items from the shipping container, and set them aside.

2. Place the cabinet on a support and attach rear legs using leg bolts. Leg levelers and leg bolts are provided among the parts in the cash box.

3. Attach the front legs (after installing leg levelers), using leg bolts.


Detail View - Leg Leveler
Leg
Leg Leveler
Shaft
Nut
Foot Pad
0 Degrees
Approx Playfield Pitch Angle: 6 - 7 Degrees
See Detail View

Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.

5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass. Remove the shipping block holding the Insert Board. Unlatch and open the Insert Board. Carefully lift up the Speaker Panel and lay it down on the playfield glass. (Be careful not to damage the Dot Matrix Display/Driver.) This allows access to the bolt holes used for securing the backbox upright. To secure the backbox, install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet. Close and latch the Insert Board. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

⚠ CAUTION

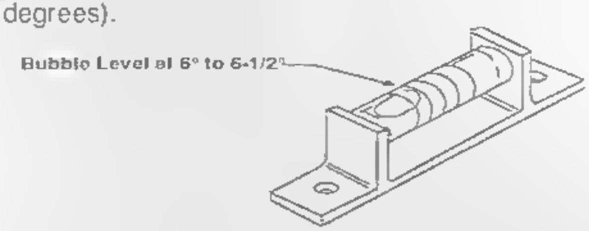
FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury.
NEVER TRANSPORT a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler *slightly* below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.

7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game. Lift the front molding off the playfield cover glass return the latch lever toward the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game.

8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). *NOTE:* It is recommended that this measurement be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

9. The TRU-PITCH™ level is located on the shooter rail. This allows the operator to accurately pitch the game - WITHOUT REMOVING THE GLASS - when it is first set in a new location. The first line on the level is approximately 6 degrees. Every line after that is approximately another 1/2 degree of pitch. We recommend you pitch the game with the NOSE of the bubble between the first and second line on the level (between 6 and 6-1/2 degrees).



! IMPORTANT !

Playfield pitch angle can affect the operation of the plumb bob tilt. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting. The unit is factory installed for a 6-1/2 degree angle. If an adjustment is necessary, loosen the screw at the bottom of the unit. Move the pointer, one grove at a time to the left or the right, depending on the degree desired. Hold the pointer in place and tighten screw.

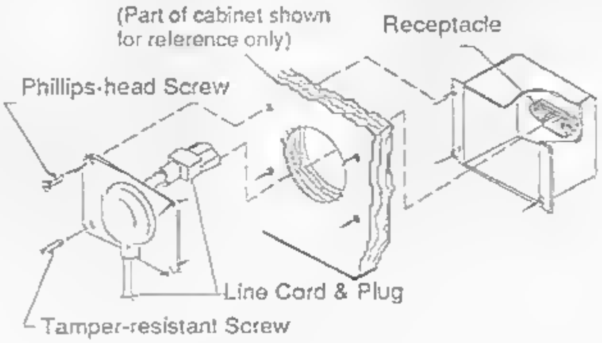
10. Move the game into the desired location; recheck the level and pitch angle of the playfield.

11. Be sure the ***required number*** of ball are installed. Dracula uses four balls.

12. Install playfield mylars if desired. ***NOTE:*** The Dracula playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-8860-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass. Prepare the game for player operation.

14. To attach the line cord, remove the envelope stapled to the inside of the cabinet (near the cashbox). Remove the four Phillips-head screws that mount to line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle, and push the line cord securely into place. Make sure the cord is aligned with the indentation on the cover plate (indentation should point toward bottom of the cabinet). Remount line cord cover plate. If desired, four tamper resistant screws have been provided in an enevlope marked "Security Screws" (located in the cashbox) to remount cover plate.



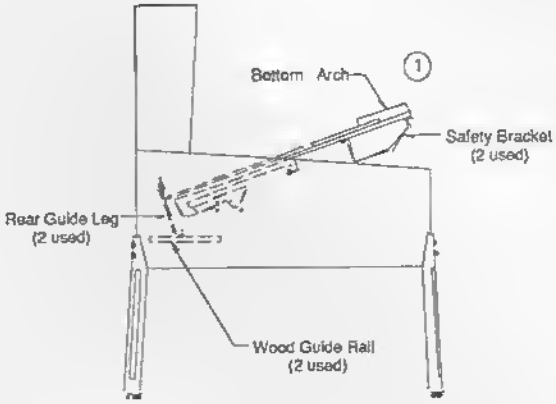
RAISING THE PLAYFIED

⚠ CAUTION

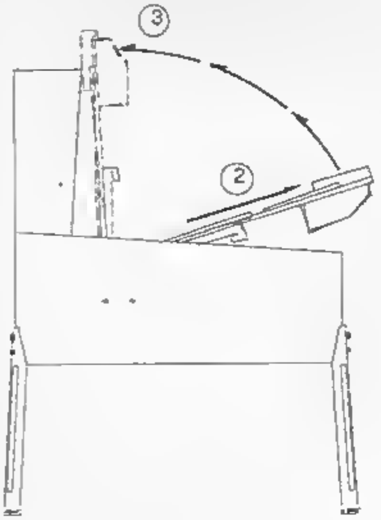
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

To raise the playfield.

1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.

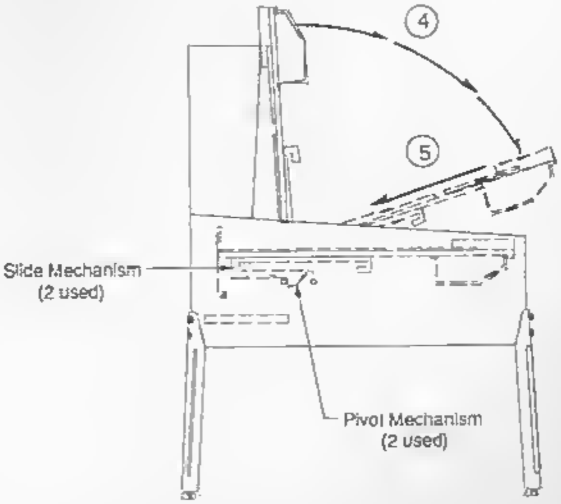

Bottom Arch
①
Safety Bracket
(2 used)
Rear Guide Leg
(2 used)
Wood Guide Rail
(2 used)

2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3".
   Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.
3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click; this insures locking and pivoting sequence.



To lower the playfield.

4. Rotate the playfield to the rest position. This unlocks the pivoting mechanism.
5. Push back playfield into cabinet and into playing position.


④
⑤
Slide Mechanism
(2 used)
Pivot Mechanism
(2 used)

GAME CONTROL LOCATIONS

Cabinet Switches

The On-Off Switch is on the bottom of the cabinet near the right front leg.
The Start Button is a pushbutton to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

Coin Door Buttons

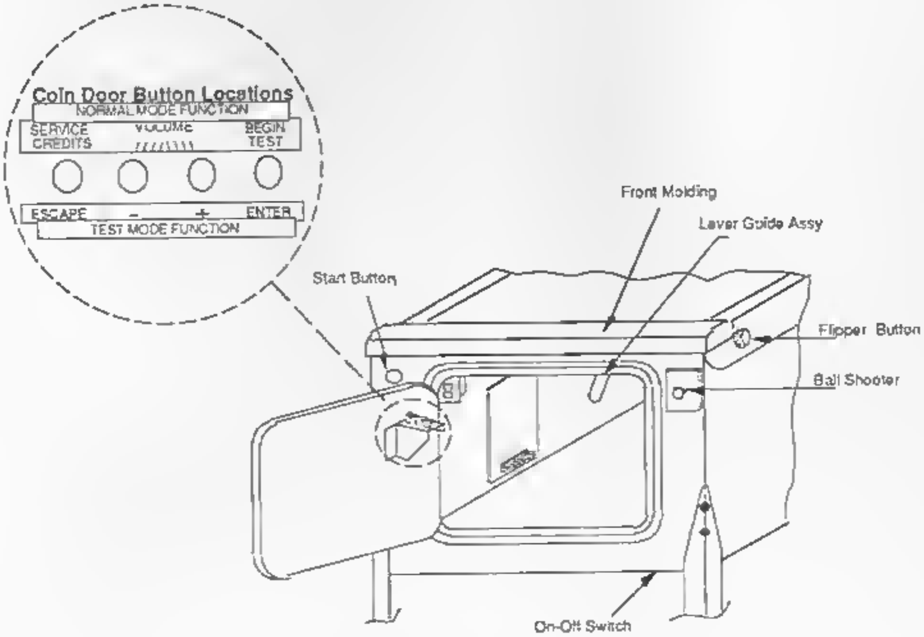
The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four pushbutton switches mounted on the inside of the coin door. The Coin Door Buttons have two modes of operation Normal Function and Test Function.

Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.
The Volume Up (+)button raises the sound level of the game. Press and hold the button until the desired level is reached.
The Volume Down (-) button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound Off completely.
The Begin Test button starts the Menu System Operation and changes the Coin Door Buttons from Normal Function to Test Function.

Test Function

The Escape button allows you to get out of a menu selection or return to the Attract Mode.
The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.
The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.
The Enter button allows you to get into a menu selection or lock in an adjustment choice.
Holding the Enter button for five seconds, during the Attract Mode, resets the High Scores.


Coin Door Button Locations
NORMAL MODE FUNCTION
SERVICE CREDITS
VOLUME
BEGIN TEST
ESCAPE
-
+
ENTER
TEST MODE FUNCTION
Front Molding
Lever Guide Assy
Start Button
Flipper Button
Ball Shooter
On-Off Switch

GAME OPERATION

⚠ CAUTION

After assembly and installation at its site location, this game must be plugged into a properly grounded outlet to prevent shock hazard, and to assure proper game operation. DO NOT use a 'cheater' plug to defeat the ground pin on the line cord. DO NOT cut off the ground pin.

POWERING UP With the coin door closed, plug the game in, and switch it On. In normal operation, Testing shows in the displays as the game performs Start-up Tests. Once the Start-up Tests have been successfully completed the last score is displayed. After that, the game goes into the Attract Mode.

Note: After the game has been on location for a time, the Start-up Tests may contain messages concerning game problems. The section entitled 'Error Messages' contains more details concerning messages displayed at each game turn-on.

Open the coin door and press the Begin Test switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, the revision level of the system software, and the date the software was revised.

Example:

```
          DRACULA                          Sound  Rev. L-1
     50001              Rev. L-X        SY. 0.X0            X-X-93
```

Press the Enter button to enter the WPC Menu System (refer to the section entitled "Menu System Operation" for more information). Perform the entire Test Menu routine to verify that the game is operating satisfactorily.

ATTRACT MODE*. After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode, the score display shows a series of messages informing the player concerning, recent highest scores*, "custom messages*", and the score to achieve to obtain a Replay award*.

CREDIT POSTING. Insert coin(s). A sound is heard for each coin, and the display shows the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

STARTING A GAME. Press the Launch Ball button once. A startup sound plays, and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

TILTS. Actuating the Cabinet Tilt switch inside the cabinet ends the current game and then proceeds to the Game Over Mode. With the third closure* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

END OF A GAME. All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set* appears in the display. Credit* may be awarded, when the last two digits of any player's score match the random digits. Match, high score, and game over sounds are made, as appropriate.

GAME OVER MODE. The **Game Over** display shows in the display. Then, the high scores flash. The game proceeds to the Attract Mode.

* - Operator-adjustable feature

MENU SYSTEM OPERATION

This game operates on a Menu System. The Main Menu allows you to choose from several main categories, which in turn lead to other menus to choose from. To enter the Menu System, open the coin door and press the Begin Test button. The displays show the Game I.D. Mode. Press the Enter button and the Main Menu appears. To cycle through the Main Menu, (or any other menu), selections press either the Up or Down button. Activate any selection by pressing the Enter button when the desired selection appears in the display. Return to the Attract Mode or a previous menu selection, by pressing the Escape button. Press the Start button for HELP at any time.

MAIN MENU

- **B. Bookkeeping Menu**
  - B.1 Main Audits
  - B.2 Earning Audits
  - B.3 Standard Audits
  - B.4 Feature Audits
  - B.5 Histograms
  - B.6 Time-stamps
- **P. Printouts Menu**
  - P.1 Earnings Data
  - P.2 Main Audits
  - P.3 Standard Audits
  - P.4 Feature Audits
  - P.5 Score Histograms
  - P.6 Time Histograms
  - P.7 Time-Stamps
  - P.8 All Data
- **T. Test Menu**
  - T.1 Switch Edges Test
  - T.2 Switch Levels Test
  - T.3 Single Switches Test
  - T.4 Solenoid Test
  - T.5 Flasher Test
  - T.6 General Illumination Test
  - T.7 Sound and Music Test
  - T.8 Single Lamps Test
  - T.9 All Lamps Test
  - T.10 Lamp & Flasher Test
  - T.11 Display Test
  - T.12 Flipper Coil Test
  - T.13 Ordered Lamps Test
  - T.14 Top Right Ramp Test
  - T.15 Magnet Test
- **U. Utilities Menu**
  - U.1 Clear Audits
  - U.2 Clear Coins
  - U.3 Reset H.S.T.D.
  - U.4 Set Time & Date
  - U.5 Custom Message
  - U.6 Set Game I.D.
  - U.7 Factory Adjustments
  - U.8 Factory Resets
  - U.9 Presets
  - U.10 Clear Credits
  - U.11 Auto Burn-In
- **A. Adjustments Menu**
  - A.1 Standard Adjustments
  - A.2 Feature Adjustments
  - A.3 Pricing Adjustments
  - A.4 H.S.T.D. Adjustments
  - A.5 Printer Adjustments

Press Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

Press Up
Increases sequence; (ex. A.1, A.2, A.3, A.4).

Press Down
Decreases sequence; (ex. A.4, A.3, A.2, A.1).

Use Up or Down to cycle through the selections in a menu.

Use Escape and Enter to move into and out of the selected menu.

Bookkeeping is the first category available from the Main Menu. Press the Enter button to activate the Bookkeeping Menu. Press the Up or Down button to cycle through the Bookkeeping Menu selections. Press the Enter button to activate a selection. Once you have activated a selection, press the Up or Down button to cycle through the available audits. Audits cannot be set, they can only be cleared by using U1 and U2 from the Utilities Menu. Press the Escape button to return to the Bookkeeping Menu. Press it again to return to the Main Menu.

B. BOOKKEEPING MENU

B.1	Main Audits
B.2	Earning Audits
B.3	Standard Audits
B.4	Feature Audits
B.5	Histograms
B.6	Time-Stamps

One Button Audit System. The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

B.1 Main Audits

B.1	01	Total Earnings	00
B.1	02	Recent Earnings	00
B.1	03	Free Play Percent	00
B.1	04	Average Ball Time	00
B.1	05	Average Game Time	00
B.1	06	Total Plays	00
B.1	07	Replay Awards	00
B.1	08	Percent Replays	00
B.1	09	Extra Balls	00
B.1	10	Percent Extra Ball	00

B.2 Earning Audits

B.2	01	Recent Earnings	00
B.2	02	Recent Left Slot	00
B.2	03	Recent Center Slot	00
B.2	04	Recent Right Slot	00
B.2	05	Recent 4th Slot	00
B.2	06	Recent Paid Credits	00
B.2	07	Recent Service Credits	00
B.2	08	Total Earnings*	00
B.2	09	Total Left Slot*	00
B.2	10	Total Center Slot*	00
B.2	11	Total Right Slot*	00
B.2	12	Total 4th Slot*	00
B.2	13	Total Paid Credits*	00
B.2	14	Total Service Credits*	00

* These audits are NOT resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-stamp.

B.3 Standard Audits

B.3	01	Games Started	00
B.3	02	Total Plays*	00
B.3	03	Total Free Play	00
B.3	04	Free Play Percent	00
B.3	05	Replay Awards	00
B.3	06	Percent Replays	00
B.3	07	Special Awards	00
B.3	08	Percent Special	00
B.3	09	Match Awards	00
B.3	10	Percent Match	00
B.3	11	H.S.T.D. Credits	00
B.3	12	Percent H.S.T.D	00
B.3	13	Extra Ball	00
B.3	14	Percent Extra Ball	00
B.3	15	Tickets Awarded	00
B.3	16	Percent Tickets	00
B.3	17	Left Drains	00
B.3	18	Right Drains	00
B.3	19	Average Ball Time	00
B.3	20	Average Game Time	00
B.3	21	Play Time	00:00:00
B.3	22	Minutes On	00
B.3	23	Balls Played	00
B.3	24	Tilts	00
B.3	25	Replay 1 Awards	00
B.3	26	Replay 2 Awards	00
B.3	27	Replay 3 Awards	00
B.3	28	Replay 4 Awards	00
B.3	29	1 Player Games	00
B.3	30	2 Player Games	00
B.3	31	3 Player Games	00
B.3	32	4 Player Games	00
B.3	33	H.S.T.D. Reset Count	00
B.3	34	Burn-in Time†	00:00:00
B.3	35	1st Replay Level	00
B.3	36	Left Flipper	00
B.3	37	Right Flipper	00

* *"Total Plays" only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.*

† This audit is not resettable.

B.4 Feature Audits

B.4	01	Outlane Lit	00%	00
B.4	02	Outlane Special	00%	00
B.4	03	Outlane Extra Ball	00%	00
B.4	04	Loop Extra Ball Lit	00%	00
B.4	05	Video Mode Extra Ball	00%	00
B.4	06	Mystery Extra Ball	00%	00
B.4	07	All Locks	00%	00
B.4	08	All Multiballs	00%	00
B.4	09	Carriage Total	00%	00
B.4	10	Carriage 1st	00%	00
B.4	11	Castle Multiball Total	00%	00
B.4	12	Castle Multiball 1st	00%	00
B.4	13	Coffin Multiball Total	00%	00
B.4	14	Coffin Multiball 1st	00%	00
B.4	15	Bonus X's	00%	00
B.4	16	Altars Total	00%	00
B.4	17	Altars 1st	00%	00
B.4	18	Altars 2nd	00%	00
B.4	19	Altars 3rd	00%	00
B.4	20	Altars 4th	00%	00
B.4	21	Altars 5th	00%	00
B.4	22	Rat Mode Total	00%	00
B.4	23	Rat Mode 1st	00%	00
B.4	24	Loops Total	00%	00
B.4	25	Loops 1st	00%	00
B.4	26	Loops 2nd	00%	00
B.4	27	Loops 3rd	00%	00
B.4	28	Loops 4th	00%	00
B.4	29	Loops 5th	00%	00
B.4	30	Bat Mode Total	00%	00
B.4	31	Bat Mode 1st	00%	00
B.4	32	Mystery Total	00%	00
B.4	33	Mystery 1st	00%	00
B.4	34	Video Mode Total	00%	00
B.4	35	Video Mode 1st	00%	00
B.4	36	Video Modes Won	00%	00
B.4	37	Video Modes Lost	00%	00
B.4	38	Ball Save	00%	00
B.4	39	Magnet Faults	00%	00
B.4	40	T.R. Ramp Faults	00%	00
B.4	41	Other Sw. Faults	00%	00
B.4	42	2X Multi-Multiball	00%	00
B.4	43	3X Multi-Multiball	00%	00
B.4	44	Mist Multiball Attempts	00%	00

B.5 Histograms

B.5	01	0-1.9 Million Scores	00%	00
B.5	02	2-4.9 Million Scores	00%	00
B.5	03	5-9.9 Million Scores	00%	00
B.5	04	10-19 Million Scores	00%	00
B.5	05	20-29 Million Scores	00%	00
B.5	06	30-39 Million Scores	00%	00
B.5	07	40-49 Million Scores	00%	00
B.5	08	50-69 Million Scores	00%	00
B.5	09	70-99 Million Scores	00%	00
B.5	10	100-149 Million Scores	00%	00
B.5	11	150-199 MillionScores	00%	00
B.5	12	200-299 Million Scores	00%	00
B.5	13	Over 300 Million Scores	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00
B.5	15	Game Time 1.0-1.5 Mins	00%	00
B.5	16	Game Time 1.5-2.0 Mins	00%	00
B.5	17	Game Time 2.0-2.5 Mins	00%	00
B.5	18	Game Time 2.5-3.0 Mins	00%	00
B.5	19	Game Time 3.0-3.5 Mins	00%	00
B.5	20	Game Time 3.5-4.0 Mins	00%	00
B.5	21	Game Time 4-5 Mins	00%	00
B.5	22	Game Time 5-6 Mins	00%	00
B.5	23	Game Time 6-8 Mins	00%	00
B.5	24	Game Time 8-10 Mins	00%	00
B.5	25	Game Time 10-15 Mins	00%	00
B.5	26	Game Time Over 15 Mins	00%	00

B.6 Time-Stamps

Time-Stamps Menu allows you to view dates and times that are important to game software.

B.6	01	Current Time
B.6	02	Clock 1st Set
B.6	03	Clock Last Set
B.6	04	Audits Cleared
B.6	05	Coins Cleared
B.6	06	Factory Setting
B.6	07	Last Game Start
B.6	08	Last Replay
B.6	09	Last H.S.T.D. Reset
B.6	10	Champion Reset
B.6	11	Last Printout
B.6	12	Last Service Credit

Press the Enter button to activate the Printouts Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Printouts Menu selections. Press the Enter button to activate a selection. Press the Escape button to return to the Printouts Menu. Press in again to return to the Main Menu.

P. PRINTOUTS MENU

(optional board required)

- P.1 Earnings Data
- P.2 Main Audits
- P.3 Standard Audits
- P.4 Feature Audits
- P.5 Score Histograms
- P.6 Time Histograms
- P.7 Time-Stamps
- P.8 All Data

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no Printer is attached the the message "Waiting for Printer" appears in the displays.
NOTE: Set the print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Enter button to activate the Test Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Test Menu selections. Press the Enter button to activate a test. Press the Escape button to return to the Test Menu. Press it again to return to the Main Menu. **NOTE:** During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

T. TEST MENU

T.1 Switch Edges Test
T.2 Switch Levels Test
T.3 Single Switch Test
T.4 Solenoid Test
T.5 Flasher Test
T.6 General Illumination Test
T.7 Sound & Music Test
T.8 Single Lamps Test
T.9 All Lamps Test
T.10 Lamp & Flasher Test
T.11 Display Test
T.12 Flipper Coil Test
T.13 Ordered Lamps Test
T.14 Top Right Ramp Test
T.15 Magnet Test

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, the number on the right indicates the row. Example - Switch 23 is 2nd column, 3rd row.

A short to ground - on either the row or column wire - appears as a shorted row(s). However, a column wire shorted to ground disappears when all of the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed), complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom" switch (in this case #22).

T.1 Switch Edges Test Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other then the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

T.2 Switch Levels Test This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

T.3 Single Switches Test The Single Switch Test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

T.4 Solenoid Test

The Solenoid Test has three modes, Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if: more then one solenoid pulses, a solenoid comes On and stays On or, during the Repeat and Run mode, no solenoid pulses.

Repeat - The Repeat mode pulses a single solenoid. After entering this test, Solenoid 1 shows in the display and the corresponding solenoid activates. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to move to the next mode.

Stopped - The Stopped mode halts the Solenoid Test. Press Enter during the Repeat mode and the Solenoid Test stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to move to the next mode.

Running - The Running mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed.

T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test, has three modes: Repeat, Stop, and Run. During this test, only one flashlamp circuit should pulse at a time. The system has detected a problem if more then one circuit pulses, a circuit stays On or, during the Repeat and Run mode, no circuit pulses.

Repeat - The Repeat mode pulses a single flashlamp. After entering this test, the name and number of the first flashlamp circuit shows in the display and the corresponding bulb(s) flash. Press the Up or Down button to cycle through all of the flashlamps circuits one at a time. The same circuit pulses until press the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stopped - The Stopped mode halts the Flasher Test. No flashlamp circuit should be active during this mode. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Running - The Running mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed, and the corresponding bulb(s) flash.

T.6 General Illumination Test

This test checks all of the General Illumination circuits. There are two modes of operation: Stop and Run.

Stopped - Press the Up or Down buttons to cycle through the General Illumination Test manually. All Illumination is tested first, followed by an individual circuit test. The circuit name and number shows in the display while the corresponding lamps lights. If any other results occur the system has detected an error.

Running - Press the Enter button any time during Stopped mode and the General Illumination. Test cycles through automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occurs the system has detected a problem.

T.7 Sound and Music Test The Sound and Music Test checks the audio circuits. This test has three modes for testing the sound and music circuits, Run, Repeat and Stop.

Running - The Running mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound or tune without having to wait for the program to play all the sounds available in the test. A sound or tune should be heard for each name and number that appears in the display. Any other results indicates the system has detected a problem.

Repeat - Press the Enter button at any time during the Running mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.

Stopped - Press the Enter button at any time during the Repeat mode to stop this test altogether. Nothing should be heard. Any other results indicates the system has detected a problem.

T.8 Single Lamp Test The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through this test. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

T.9 All Lamps Test This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicates the system has detected a problem.

T.10 Lamp and Flasher Test This test causes all the flashlamps and the controlled lamps to flash at the same time. The controlled lamps blink, while the flashlamps cycle from highest to lowest. Any other results indicates the system has detected a problem.

T.11 Display Test This test automatically checks every dot in the Dot Matrix Display. A series of patterns appear in sequence. Each pattern turns On and Off a section of dots. Every dot on the matrix display should be turned On and off during this test.

T.12 Flipper Coil Test

The Flipper Coil Test has three modes, Repeat, Stop, and Run. Only one Flipper should pulse at a time. The system has detected a problem if; more then one flipper pulses, a flipper comes On and stays On or, during the Repeat and Run mode, no flipper pulses.

Repeat - The Repeat mode pulses a single flipper. After entering this test, flipper coil 01 shows in the display and the corresponding coil activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to move to the next mode.

Stopped - 'The Stopped mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the test stops. No coils should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to move to the next mode.

Running - The Running mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed.

T.13 Ordered Lamps Test

The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through the lamps. Lamps light In a clock-wise or counter clock-wise direction starting from the bottom of the playfield. Direction depends on which button, Up or Down, is pressed. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

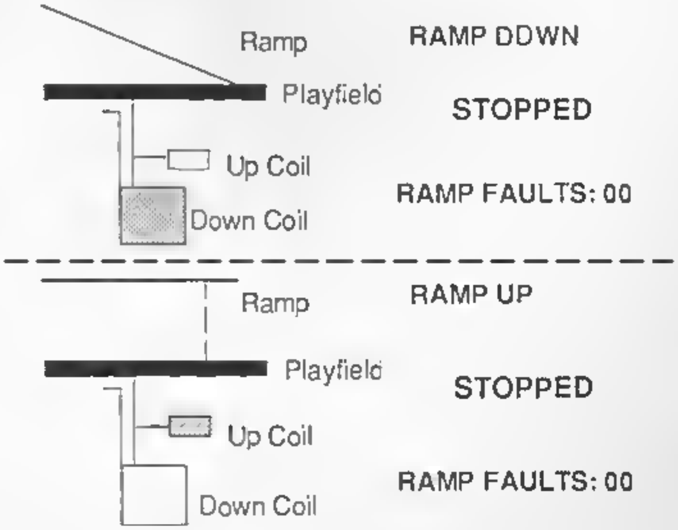
T.14 Top Right Ramp Test

The Dot Matrix display shows a side view of the Up/Down Ramp. The bottom line of the display shows a "test running" or "error" line.

This test is similar in function to the coil test. The different sub-tests can be selected by the Up and Down buttons. And there are three modes to this test (controlled by the Enter button).

RUNNING - Automatically cycle through the different sub-tests.
REPEAT - Remain on the same sub-test.
STOPPED - Turn off all coils, remain on this sub-test.

DOT MATRIX DIAGRAM



Switches
When the Right Ramp Down switch is closed, the ramp will be shown in the down position.

Coils
When the Right Ramp Down coil is activated, the coil is 100% filled.
When the Right Ramp Up coil is activated, the coil is also 100% filled.

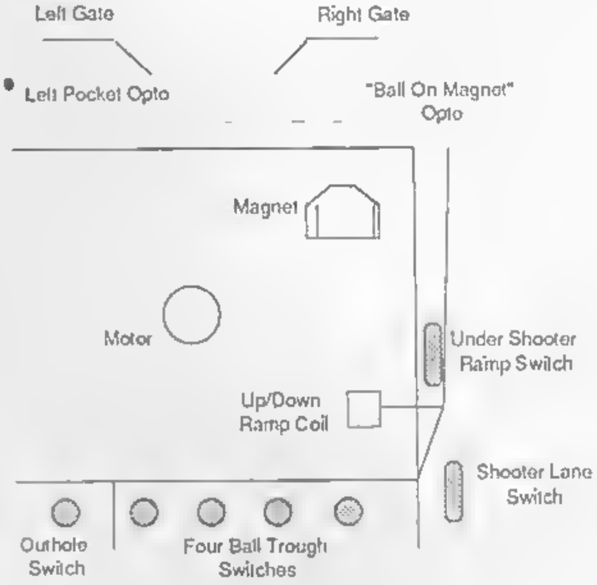
T.15 Magnet Test (also see Maintenance Information) The Dot Matrix display shows a front view of the magnet, shooter lane, shooter ramp, trough and outhole.

A switch or motor is considered "active" if it's area is filled in. The 24" opto beam shown by a dotted line (this represents the infrared beam). The bottom line of the display shows a "test moving", or "error" line.

This test is similar in function to the coil test. The different sub-tests can be selected by the Up and Down buttons. There are three modes to this test (controlled by the Enter button).

RUNNING - Automatically cycle through the different sub-tests.
REPEAT - Remain on the same sub-test.
STOPPED - Turn off all coils, remain on this sub-test. (Note: Ignore errors generated by Stopped Mode.)

DOT MATRIX DIAGRAM



__Switches__
Left Pocket Opto
Main "Ball On Magnet" Opto
Under Shooter Ramp Switch
Shooter Lane Switch
4 Trough Switches
1 Outhole Switch

__Coils__
2 Gates (left and right)
1 Magnet
1 Lifting Shooter Ramp
Motor On/Off (On = filled in motor picture.)
Controlled Lamp (not shown on Dot Matrix Display).

__Sub-Tests__

Unload Magnet:	Magnet moves without a ball. The display shows the location of the magnet.
Opto Check 1:	Controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered.
Load Magnet:	Ball is loaded onto the magnet. The Up/Down coil is filled in when activated.
Opto Check 2:	Same as Opto Check 1.
Magnet On + Left:	The ball moves across the playfield. The left and right gates lift up to allow the ball to pass underneath. The magnet and motor shown on the display are filled in, and the location of the ball is shown on the dotted line. (*Note:* There are two balls shown when only one is in the Left Opto Pocket because two opto switches are activated when a ball enters. The Left Opto Pocket is shown as a dot when it sees a beam and as a ball when the beam is broken.)
Opto Check 3:	Same as Opto Check 1.
Magnet On + Right:	Same as Magnet On + Left.
Magnet Off + Left: Magnet Off + Right:	The magnet moves across the playfield without a ball. The motor, shown on the display, is filled in when it is activated.

Press the Enter button to activate the Utilities Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Utility Menu selections. Press the Enter button to activate a selection. Use the Up or Down button to rotate the settings. Press the Enter button to lock in a setting. If a mistake is made while changing a setting, press the Escape button while "Saving Adjustment Value" is still in the display. The original setting is retained and the new setting is ignored. Press the Escape button to return to the Utilities Menu. Press it again to return to the Main Menu.

U. Utilities Menu

U.1	Clear Audits
U.2	Clear Coins
U.3	Reset H.S.T.D.
U.4	Set Time & Date
U.5	Custom Message
U.6	Set Game I.D.
U.7	Factory Adjustments
U.8	Factory Resets
U.9	Presets
U.10	Clear Credits
U.11	Auto Burn-In

U.1 Clear Audits Press the Enter button to clear the Standard Audits (except Burn-in Time), Feature Audits, and Histograms.

U.2 Clear Coins Press the Enter button to clear the Earnings Audits.

U.3 Reset H.S.T.D. Press the Enter button to clear the High Score to Date Table and the Grand Champion.

U.4 Set Time and Date Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.5 Custom Message Set A.1 20 to ON before trying to write a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to rotate letters. Use the Start button to rotate punctuation marks, (if desired). Press the Enter button to lock in the desired letter and punctuation. If a mistake is made, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once the message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If Enter is pressed, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

U.6 Set Game I.D. This utility allows for the installation of a message, such as game location, that only appears on printouts. Press the Enter button to activate Set Game I.D.. Use the Up or Down button to rotate letters. Use the Start button to rotate punctuation marks, (if desired). Press the Enter button to lock in the desired letter and punctuation.

U.7 Factory Adjustment Press the Enter button to restore the adjustments to factory settings.

U.8 Factory Reset Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

U.9 Presets Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

Game Difficulty Levels The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual group.

U.9 01 Install Extra Easy
MUCH LESS difficult than factory setting.

U.9 02 Install Easy
Somewhat LESS difficult than factory setting.

U.9 03 Install Medium
About the SAME as factory setting.

U.9 04 Install Hard
Some what MORE difficult than factory setting

U.9 05 Install Extra Hard
MUCH MORE difficult than factory setting.

Difficulty Setting Table for U.S., Canadian and French Games

Adj #	Adj Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 09	Pre-light Video Mode	3 Lamps	2 Lamps	None	None	None
A.2 10	Video Mode Award	5 Lamps	1 Lamp	None	None	None
A.2 11	Bonus 'X' memory	Yes	Yes	Yes	Yes	Yes
A.2 12	Castle Lock Timer	20 sec	15 sec	15 sec	13 sec	12 sec
A.2 13	Castle Jackpot	30 sec	30 sec	20 sec	20 sec	20 sec
A.2 14	Jet Timer	10 sec	10 sec	10 sec	10 sec	10sec
A.2 15	Pre-light Coffin	2 lamps	0 lamps	0 Lamps	0 Lamps	0 Lamps
A.2 16	Coffin Ramp Time	15 sec	15 sec	15 sec	15 sec	15 sec
A.2 17	Left Ramp Time	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 18	Mystery Time	10 sec	8 sec	5 sec	5 sec	5 sec
A.2 19	Mystery Pre-light	Ball Start	Game Start	Game Start	Game Start	Not Lit
A.2 20	Mystery: Castle Lock	10%	10 %	10%	8%	5%
A.2 21	Mystery: Coffin Lock	10%	10 %	10%	8%	5%
A.2 22	Mystery: Video Mode	10%	15%	10%	8%	5%
A.2 23	Mystery: Bonus 'X'	33%	25%	25%	20%	15%
A.2 24	Video Mode Diff.	Easy	Medium	Medium	Medium	Hard
A.2 25	1st Loop Bonus	Loop 6	Loop 3	Loop 6	Loop 6	Loop 6
A.2 26	Other Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 6	Loop 10
A.2 27	1st Mist Multiball lit	Loop 5	Loop 5	Loop 5	Loop 5	Loop 7
A.2 28	Other Mist Multiball	Loop 10	Loop 10	Loop 10	Loop 15	Loop 15
A.2 29	1st Bats	Loop 2	Loop 2	Loop 3	Loop 3	Loop 3
A.2 30	Other Bats	Loop 5	Loop 6	Loop 10	Loop 10	Loop10
A.2 31	Bats Time	20 sec	15 sec	15 sec	15 sec	15 sec
A.2 32	Number of Bats	10	15	15	20	25
A.2 33	Outlane Lit At	Altar 10	Altar 15	Altar 15	Altar 20	Altar 25
A.2 34	1st Rats at	Altar 2	Altar 2	Altar 3	Altar 3	Altar 3
A.2 35	Next Rats at	Altar 3	Altar 4	Altar 5	Altar 5	Altar 5
A.2 36	Number of Rats	10	15	15	20	25
A.2 37	Rats Timer	20 sec	15 sec	15 sec	15 sec	15 sec

Difficulty Setting Table for German and European Games

Adj #	Adj Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 09	Pre-light Video Mode	3 Lamps	None	None	None	None
A.2 10	Video Mode Award	5 Lamps	None	None	None	None
A.2 11	Bonus 'X' memory	Yes	Yes	Yes	Yes	Yes
A.2 12	Castle Lock Timer	20 sec	15 sec	13 sec	12 sec	10 sec
A.2 13	Castle Jackpot	30 sec	20 sec	20 sec	20 sec	20 sec
A.2 14	Jet Timer	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 15	Pre-light Coffin	2 lamps	None	None	None	None
A.2 16	Coffin Ramp Time	15 sec	15 sec	15 sec	15 sec	15 sec
A.2 17	Left Ramp Time	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 18	Mystery Time	10 sec	5 sec	5 sec	5 sec	5 sec
A.2 19	Mystery Pre-light	Ball Start	Game Start	Game Start	Not Lit	Not Lit
A.2 20	Mystery: Castle Lock	10%	10%	8%	5%	3%
A.2 21	Mystery: Coffin Lock	10%	10%	8%	5%	3%
A.2 22	Mystery: Video Mode	10%	10%	8%	5%	3%
A.2 23	Mystery: Bonus 'X'	33%	25%	20%	15%	10%
A.2 24	Video Mode Diff.	Easy	Medium	Medium	Hard	Ex. Hard
A.2 25	1st Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 6	Loop 6
A.2 26	Other Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 10	Loop 10
A.2 27	1st Mist Multiball lit	Loop 5	Loop 5	Loop 5	Loop 7	Loop 7
A.2 28	Other Mist Multiball	Loop 10	Loop 10	Loop 15	Loop 15	Loop 20
A.2 29	1st Bats	Loop 2	Loop 3	Loop 3	Loop 3	Loop 3
A.2 30	Other Bats	Loop 5	Loop 10	Loop 10	Loop 10	Loop 10
A.2 31	Bats Time	20 sec	15 sec	15 sec	15 sec	15 sec
A.2 32	Number of Bats	10	15	20	25	30
A.2 33	Outlane Lit At	Altar 10	Altar 15	Altar 20	Altar 25	Altar 30
A.2 34	1st Rats at	Altar 2	Altar 3	Altar 3	Altar 3	Altar 3
A.2 35	Next Rats at	Altar 3	Altar 5	Altar 5	Altar 5	Altar 5
A.2 36	Number of Rats	10	15	20	25	30
A.2 37	Rats Timer	20 sec	15 sec	15 sec	15 sec	15 sec

U.9 06 Install 5 Ball
U.9 07 Install 3 Ball Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including the changing of certain features to the recommended 3-and 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

Preset Adjustments Table for U.S. and Canadian Games

Adj #	Adj Description	Install 5-ball U.9 06	Install 3-ball U.9 07
U.9 03	Install Medium	Not Used	Yes
U.9 04	Install Hard	Yes	Not Used

U.9 08 Install Add -A -Ball This option deletes all Free Play awards and replaces them with Extra Ball awards. Individual adjustments are affected, as follows:

Ad	Name	New Setting
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Ex. Ball
A.1 15	Special Award	Ex. Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

U.9 09 Install Ticket This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected as follows:

Ad	Name	New Setting
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Ex. Ball Ticket	Yes
A.1 31	Ticket Expan.Brd.	Yes
A.4 02	H.S.T.D. Award	Ticket

U.9 10 Install Novelty This option removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

Ad	Name	New Setting
A.1 04	Max. Ex. Ball	Off
A.1 05	Replay System	Fixed
A.1 09	Replay Level 1	Off
A.1 10	Replay Level 2	Off
A.1 11	Replay Level 3	Off
A.1 12	Replay Level 4	Off
A.1 15	Special Award	Points
A.1 19	Match Feature	Off
A.4 01	Highest Score	On
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

U.9 11 Install Buy-in This option automatically sets game pricing to 1 for 50¢/2 for $1.00 and 1 Coin Buy-in (A.3 19) to YES.

U.9 12 Not Used

U.9 13 Not Used

U.9 14 Not Used

U.9 15 Not Used

U.9 16 Not Used

U.9 17 Install German 1 •
U.9 18 Install German 2 •
U.9 19 Install German 3 •
U.9 20 Install German 4 •
U.9 21 Install German 5 •
U.9 22 Install German 6 • Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups.

Preset Adjustments Table for German Games

Adj #	Adj Description	German 1 U.9 17	German 2 U.9 18	German 3 U.9 19	German 4 U.9 20	German 5 U.9 21	German 6 U.9 22
A.1 14	Replay Award	Credit	Ticket	Audit	Credit	Ticket	Audit
A.1 15	Special Award	Credit	Ex. Ball	Points	Credit	Ex. Ball	Points
A.1 16	Match Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.1 19	Match Feature	7%	7%	Off	7%	7%	Off
A.3 01	Game Pricing	6spiele/5DM	6spiele/5DM	6spiele/5DM	7spiele/5DM	7spiele/5DM	7spiele/5DM
A.4 02	H.S.T.D. Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.4 04	Champion Credits	03	03	00	03	03	00
A.4 05	H.S.T.D. 1 Credits	01	01	00	01	01	00
A.4 06	H.S.T.D. 2 Credits	00	00	00	00	00	00
A.4 07	H.S.T.D. 3 Credits	00	00	00	00	00	00
A.4 08	H.S.T.D. 4 Credits	00	00	00	00	00	00
A.4 10	Backup Champion	500,000,000	500,000,000	00	500,000,000	500,000,000	00
A.4 11	Backup H.S.T.D. 1	450,000,000	450,000,000	00	450,000,000	450,000,000	00
A.4 12	Backup H.S.T.D. 2	400,000,000	400,000,000	00	400,000,000	400,000,000	00
A.4 13	Backup H.S.T.D. 3	350,000,000	350,000,000	00	350,000,000	350,000,000	00
A.4 14	Backup H.S.T.D. 4	300,000,000	300,000,000	00	300,000,000	300,000,000	00

• For German Jumpered CPU Boards only.

German Jumpers are:

W14	W15	W16	W17	W18
In	In	In	In	Out

U.9 23 Install French 1*
U.9 24 Install French 2*
U.9 25 Install French 3*
U.9 26 Install French 4*
U.9 27 Install French 5*
U.9 28 Install French 6* Adjustments U.9 23 through U.9 26 are used to modify game pricing and type of play. The preset Game Adjustments Table for French Games lists the adjustments and settings that comprise the individual groups.

Preset Adjustments Table for French Games

Adj#	Adj Description	French 1 U.9 23	French 2 U.9 24	French 3 U.9 25	French 4 U.9 26	French 5 U.9 27	French 6 U.9 28
A.2 04	Auto Ex. Ball	20%	15%	25%	25%	20%	20%

* For French Jumpered CPU Boards only.

French Jumpers are:

W14	W15	W16	W17	W18
In	In	In	Out	Out

U.10 Clear Credits Press the Enter button to clear the game Credits.

U.11 Auto Burn-in Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This helps in finding intermittent problems. The tests that Auto Burn-in cycles through are: the Display Test, the Sound and Music Test, the All Lamps Test, the Solenoid Test, the Flashers Test, the General Illumination Test, and the Flipper Coil Test. All of the test run are run concurrently. The time spent on the burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Enter button to activate the Adjustments Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Adjustments Menu selections. Press the Enter button to activate a selection. Press the Up or Down button to cycle through the available adjustments. Press the Enter button to activate an adjustment. When an adjustment is activated, the setting value begins to flash. Use the Up or Down button to raise or lower the setting value. Press Enter to lock in the value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained. Press the Escape button to return to the Adjustments Menu. Press it again to return to the Main Menu.

A. ADJUSTMENTS MENU

A.1 **Standard Adjustments**
A.2 **Feature Adjustments**
A.3 **Pricing Adjustments**
A.4 **H.S.T.D Adjustments**
A.5 **Printer Adjustments** (optional board required)

A.1 Standard Adjustments

A.1 01 **Balls Per Game**
A "game" is defined by specifying the number of balls to be played.
Range: 1 to 10.

A.1 02 **Tilt Warnings**
The number of total actuations of the plumb bob mechanism that can occur before the game is "tilted".
Range: 1 to 10.

A.1 03 **Maximum Extra Balls**
The number of Extra Balls that a player may accumulate.
Range: 0 to 10.

A.1 04 **Maximum Extra Balls/Ball In Play**
The number of Extra Balls to be awarded per ball in play.

OFF - No maximum number of Extra Ball per ball in play.
1-10 - 1 through 10 Extra Balls per ball in play.

A.1 05 **Replay System**
The type of replay system to be used.

Fixed - Replay value is set and does not change during game play.
Auto%- Replay starting value is set but changes every 50 games to comply with the percentage of replays desired.

A.1 06 **Replay Percent***
The percentage of replays the players are able to earn when Auto Replay is used.
Range: 5% to 50%.

A.1 07 **Replay Start***
Replay start value when Auto% Replay is used.
Range: 15,000,000 to 250,000,000.

*For Auto% Replay.

A.1 08 Replay Levels* *For Auto% Replay.
The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 through 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

A.1 09 Replay Level 1**
A.1 10 Replay Level 2**
A.1 11 Replay Level 3**
A.1 12 Replay Level 4** ** For Fixed Replay
The value to be used for the first, second, third, and fourth Fixed Replay.
Range: 00 to 250,000,000.

A.1 13 Replay Boost
The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is cancelled when credits equal 0, the player inserts another coin, or when Begin Test is pressed.

ON - Score is boosted between 500,000 and 5,000,000 points.
OFF - Replay score is not boosted.

A.1 14 Replay Award
The form of award automatically provided when the player exceeds any replay level for either Auto% Replay or Fixed Replay.

Credit - Reaching each Replay level awards credit.
Ticket - Reaching each Replay level awards a ticket.
Ball - Reaching each Replay level awards an Extra Ball.
Audit - Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards.

A.1 15 Special Award
The award automatically provided when the player scores a special.

Credit - Scoring a Special awards a Credit.
Ticket - Scoring a Special awards a Ticket.
Ball - Scoring a Special awards an Extra Ball.
Points - Scoring a Special awards 1 Million points.

A.1 16 Match Award
The award automatically provided when the players wins a match.

Credit - Winning a Match awards a Credit.
Ticket - Winning a Match awards a Ticket.

A.1 17 Extra Ball Ticket
A Ticket is awarded when the player earns an Extra Ball.

YES - The player is awarded a Ticket in addition to an Extra Ball.
NO - The player is not awarded a Ticket

A.1 18 Maximum Ticket/Player
The amount of Tickets each player can earn.
Range: 00 to 100.

A.1 19 Match Feature
The desired percentage for the Match Feature occurring at the end of the game.

OFF - Match Feature is not available.
1 - 50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A match of these two digit results in an award of a Credit or a Ticket.

A.1 20 Custom Message
The message displayed during the Attract Mode.

YES - A message is displayed
NO - A message is not displayed.

A.1 21 Language
The language the game uses: English, French, or German.

A.1 22 Clock Style
The style of clock the game uses: A.M./P.M. or 24 Hours.

A.1 23 Date Style
The style of date the game uses: Month/Date/Year, or Date/Month/Year.

A.1 24 Show Date and Time
The date and time show in the Attract Mode.

YES - Show the date, time in status report or in the Attract Mode.
NO - Do Not show date, time in status report or in the Attract Mode.

A.1 25 Allow Dim Illumination
The game program dims the General Illumination for special effects and during the Attract Mode.

YES - Dim the General Illumination during the Attract Mode.
NO - Do Not dim the General Illumination.

A.1 26 Tournament Play
Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).

YES - Keep Multi-ball and Jackpots equal.
NO - Do Not Keep Multi-ball and Jackpots equal.

A.1 27 Euro. Scr. Format

Use either commas or dots between digits when numbers are displayed.

YES - Dots instead of commas, (example- 1.000.000).
NO - Commas instead of dots, (example- 1, 000, 000).

A.1 28 Minimum Volume Control

The volume can be turned Off.

YES - Volume can be turned Off.
NO - Volume can be turned Down but not Off.

A.1 29 General Illumination Power Saver

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines how dimness of lamps Using this feature substantially increases the life of the lamps.

Setting: - OFF, 2 to 60 minutes.

A.1 30 Power Saver Level

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range: 4 to 7. (4=dimmest)

A.1 31 Ticket Expansion Board

When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch and manual ticket dispense switch.

YES - Ticket Expansion Board is connected.
NO - Ticket Expansion Board is NOT installed in the game.

A.1 32 No Bonus Flips

The activation of flippers during the end of ball "bonus" sequence. Setting to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

When the Start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has three settings to determine how this is handled.

NEVER - Do not allow a new game start until the current game is over.

SLOW - Restart if the Start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.

INSTANTLY - Restart as soon as the Start button is pressed.

When the Start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

A.2 Feature Adjustments

A.2 01 **Ball Time**

This is the desired ball time for this game. The game will award more features to the players that are under this time.

Settings:
OFF = Do not use this.
1-99 = Desired ball time.

A.2 02 **Automatic % Special and Match**

Auto-adjust Specials through the "Percent Match Awards" (A.1 19). When this is set to YES, the Special & Match awards are regulated by adjustment "Percent Match Awards".

Settings:
YES = Auto-adjust Specials and Match to A.1 19 percent.
NO = Do not Auto-adjust Special.

A.2 03 **Ball Saver**

After ball start, this is the amount of time that "Ball Saver" lamp is lit. It allows players who drain within this time to be served another ball.

Settings:
OFF = There is no Ball Saver.
1-50 seconds = Minimum amount of time for ball to be on playfield.

A.2 04 **Automatic Extra Ball**

Automatically adjusts the award of an Extra Ball for all sources of extra balls. It does this by modifying feature adjustments 05, 06 and 07.

Settings:
OFF = do not auto adjust extra ball
1 to 99% = Auto adjust extra ball to this percentage per game.

A.2 05 **1st Extra Ball Lit At**

The number of loops (Left Ramp Shots) required to light the first extra ball.

Settings: 1 to 99 loops

A.2 06 **Next Extra Ball At**

This is the number of loops (Left Ramp Shots) required to light the second extra ball. The third extra ball is twice this value, the fourth extra ball is three times this value, etc.

Settings: 1 to 99 loops

A.2 07 **Video Mode Extra Ball At**

After completing this amount of Video Mode waves, an extra ball is awarded to the player.

Settings: 1 to 99 waves

A.2 08 **Volume Change**

This temporarily increases the volume of the game.

Settings:
YES = O.K. to occasionally increase game volume.
NO = Keep volume constant.

A.2 09 **Pre-light Video Mode**

This pre-lights the Video Mode lamps at game start.

Settings: 0 to 5 lamps pre-lit

A.2 10 **Video Mode Award**

This pre-lights the Video Mode lamps whenever a player kills all the werewolves during Video Mode.

Settings: 0 to 5 lamps pre-lit

A.2 11 **Bonus 'X' Memory**

This retains or sets the Outhole Bonus Multiplier to 1X at the start of a ball.

Settings: YES = Retain the current Outhole Bonus Multiplier.
NO = Set the Outhole Bonus to 1X at the start of a game.

A.2 12 **Castle Lock Timer**

The amount of time a Castle Lock is lit (for Castle Multiball). It is activated by either 3-bank targets in the middle of the playfield, or by the loop shot (every other loop bonus award).

Settings: 1 to 99 seconds

A.2 13 **Castle Jackpot**

This controls the amount of time a ball is temporarily locked in the castle, during Castle Multiball, for Castle Jackpot.

Settings: 0 to 120 seconds

A.2 14 **Jet Timer**

This controls the amount of time Castle Jackpot can be increased, from the Jet Bumpers. The Jet Timer is started by completing the top three lanes.

Settings: 0 to 120 seconds

A.2 15 **Pre-light Coffin**

This pre-lights the Coffin Lamps (for Coffin Locks) at game start.

Setting: 0 to 4 lamps

A.2 16 **Coffin Ramp Time**

This controls the amount of time the Coffin 2X Lamp remains on. It allows increased ramp scores and double spotting "DRACULA" for Coffin Jackpot.

Settings: 0 to 120 seconds

A.2 17 **Left Ramp Time**

This controls the amount of time the left ramp increases its score.

Settings: 0 to 120 seconds

A.2 18 Mystery Time

This controls the amount of time the Mystery Lamp remains on when the right return lane switch is activated.

Settings: 0 to 120 seconds

A.2 19 Mystery Pre-light

This controls when or if the Mystery Lamp is pre-lit.

Settings: NOT LIT = Use timer only.
LIT AT BALL START.
LIT AT GAME START.

A.2 20 Mystery: Castle Lock

This controls the Mystery award rate for enabling Castle Locks.

Settings: 0 to 99% per game

A.2 21 Mystery: Coffin Lock

This controls the Mystery award rate for enabling Coffin Locks.

Settings: 0 to 99% per game

A.2 22 Mystery: Video Mode Lit

This controls the Mystery rate for enabling Video Mode.

Settings: 0 to 99%

A.2 23 Mystery: Bonus "X"

This controls the Mystery award rate for advancing Outhole Bonus Multiplier.

Settings: 0 to 99%

A.2 24 Video Mode Difficulty

This controls how hard the Video Mode plays.

Settings: EXTRA EASY - EASY - MEDIUM - HARD - EXTRA HARD

A.2 25 1st Loop Bonus

Number of loops before advancing Coffin or Castle one more step closer to lighting a lock.
Note: This is used for the first award.

Settings: 1 to 99 loops

A.2 26 Other Loop Bonus

Number of loops before advancing Coffin or Castle one more step closer to lighting a lock.
Note: This is used after the first award.

Settings: 1 to 99 loops

A.2 27 **1st Carriage Lit**
Number of loops before lighting Mist Multiball ready lamp. ***Note:*** This is used for the first award.

Settings: 0 to 99 loops

A.2 28 **Other Carriages**
Number of loops before lighting Mist Multiball ready lamp. ***Note:*** This is used after first award.

Settings: 5 to 99 loops

A.2 29 **1st Bats**
Number of loops before starting Bat Mode. ***Note:*** This is used for the first award.

Settings: 0 to 99 loops

A.2 30 **Other Bats**
Number of loops before starting Bat Mode. ***Note:*** This is used after the first award.

Settings: 2 to 99 loops

A.2 31 **Bats Time**
Amount of time Bat Mode will last.

Settings: 0 to 45 seconds

A.2 32 **Number of Bats**
Number of Bats to start for Bat Mode.

Settings: 5 to 30 Bats.

A.2 33 **Outlane Lit At**
Number of shots into Rat Hole before lighting outlanes.

Settings: 1 to 99 altar

A.2 34 **1st Rats At**
Number of shots into Rat Hole before lighting outlanes. ***Note:*** This is used for the first award.

Settings: 1 to 99 altar

A.2 35 **Next Rats At**
Number of shots into Rat Hole before lighting outlanes. ***Note:*** This is used after first award.

Settings: 1 to 99 altar

A.2 36 **Number Of Rats**
Number of rats for the start of Rat Mode.

Settings: 5 to 99 rats

A.2 37 **Rat Timer**
Length of time for Rat Mode.

Settings: 1 to 120 seconds

A.2 38 **Timed Plunger**
This is the time allowed for a player to hit the plunger switch (or the "launch ball" switch) to start a ball. When this time is exceeded, the ball is automatically launched.

Settings: OFF = Do not automatically launch the ball.
5-120 seconds = Time allowed before the ball is automatically launched.

A.2 39 **Flipper Plunger**
If the "launch ball" switch is malfunctioning, set this adjustment to "YES" to use the left flipper to fire the plunger. Normally, the software tries to detect a malfunctioning "launch ball" switch and will automatically use the left flipper to launch a ball. Also, the plumb-bob tilts' first switch hit will also launch a ball.

Setting: NO = Do not use the left flipper to launch a ball.
YES = Use the left flipper to launch a ball.

A.2 40 **Fancy Attract Mode General Illumination**
When set to "YES", it allows the Attract Mode to blink the General Illumination lamps in an effect to attract more players. When set to "NO", General Illumination lamps are just left ON.

A.2 41 **Attract Mode Sounds**
This allows the game to make sounds, during the Attract Mode (Game Over Mode), on a regular basis.

Settings: A LOT = After a game is played it will make a lot of sounds.
SOME = After a game is played it will make 10 sounds.
NONE = After a game is played it will make no sound.

A.2 42 **Magnet**
Set to DISABLED to stop operation of the entire magnet assembly.

Settings: ENABLE - DISABLE

A.2 43 **Family Mode**
Set to "YES" to eliminate certain speech and graphic material that might be offensive to sensitive people.

Settings: YES - NO

A.2 44 **Game Over Unlock**
This controls if next player can have balls left in the locks. A player must still "earn" their Castle Locks.

Setting: NO = Keep the balls locked between games.
YES = Unlock any locked ball at game over.

A. 3 Pricing Adjustments

A.3 01 Game Pricing (If set to custom, then 02 to 09 are available)
The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

A.3 02 Left Coin Units
A.3 03 Center Coin Units
A.3 04 Right Coin Units
A.3 05 4th Slot Units
The number of coin units purchased by a coin passing through the left, center, right, or fourth coin chute.

A.3 06 Units/Credits
Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).

A.3 07 Units/Bonus
Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.

A.3 08 Bonus Credits
The number of credits that are awarded when the Units/Bonus level is achieved.

A.3 09 Minimum Units
No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).

A.3 10 Coin Door Type (If set to custom, then 11 to 15 and 20 are available)
This adjustment is used to pre-set adjustments 11 to 15 based on standard coin doors (U.S.A., German, etc.).

A.3 11 Collection Text
The coin system is used to display the Earning Audits.

A.3 12 Left Slot Value
A.3 13 Center Slot Value
A.3 14 Right Slot Value
A.3 15 4th Slot Value
The monetary value of the left, center, right, or fourth coin chute.

A.3 16 Maximum Credits
The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits.

A.3 17 Free Play

A player can operate the game without a coin (free play) or with a coin.

NO - A coin is necessary for game play.
YES - Game play is free; no coin required.

A.3 18 Hide Coin Audits

The coin audits may, or may not, be displayed.

YES - The coin audits are not displayed.
NO - The coin audits are displayed.
HIDE NAMES - The coin audit value is shown but not the audit name.

A.3 19 1 Coin Buy-In

If the game pricing is set to1 for 50c/2 for $1.00 the player can be allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit.

YES - The player has 10 seconds to buy-in at 1 coin per game.
NO - The buy-in feature is disabled.

A.3 20 Base Coin Size

This number is used for ticket per coin calculations.

A.3 21 Coin Meter Units

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.

A.3 22 Dollar Bill Slot

The system normally requires 150 msec between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast-pulsing dollar bill validator connected to one of the coin switches.

NONE = No validator connected.
LEFT = Validator connected to left slot.
CENTER = Validator connected to center slot.
RIGHT = Validator connected to right slot
FOURTH = Validator connected to fourth.

A.3 23 Minimum Coin Msec.

This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

Pricing Table

Country	Coin Chutes Left Chute		Center	4th Right	Games/Coins	Display	Pricing Adjustments A3 02 03 04 05 06 07 08 09
USA	25c	$1.00'	25c	-	1/25¢, 4/$1[2]	USA 4/$1.00	
					1/50¢, 2/75¢, 3/$1 [2]	50¢, 75¢, $1.00	
					1/50¢, 2/$1[2]	USA 2/$1.00	
					1/25¢, 3/$1 2	USA 3/$1.00	
					1/50, 2/$1.00, 6/$2.00	USA 6/$2.00	
					1/50, 2$1.00, 5/$2.00	USA 5/$2.00	
					1/50, 2/$1.00, 4/$150, 6$2.00 [1, 2]	6/$2 00 4/$1.50	
					1/25¢, 3/50¢, 6/$1	CUSTOM	01 04 01 00 01 02 01 00
					1/25¢, 5/$1	CUSTOM	01 00 01 00 01 04 01 00
Canada	25c	-	$1.00	-	1/50¢, 2/75¢, 3/$1 [2]	CANADA 1	
					1/50¢, 2/$1 [2]	CANADA 2	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch 2	AUSTRIA	
	5sch	-	10sch	-	2/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20c	$1	$1	$2	1/$1, 3/$2 [2]	AUSTRALIA	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1 [2]	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr [2]	SWISS	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr , 3/50Fr [2]	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 5/5DM [1,2]	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM [2]	GER. 1/1DM	
					1/1DM, 2/2DM, 6/5DM [1,2]	GER. 6/5DM	
					1/1DM, 3/2DM, 9/5DM	CUSTOM	09 18 45 00 05 00 01 00
					1/2x1DM, 1/2DM, 3/5DM	CUSTOM	03 05 15 00 05 00 01 00
					2/1DM, 5/2DM, 14/5DM	CUSTOM	13 26 65 00 05 65 01 00
Holland	1G	-	1G	-	1/1G	HOLLAND	
Sweden	1Kr	5Kr	10Kr	-	1/5x1Kr, 1/5kr, 2/10Kr[1,2]	SWEDEN 1	
	5Kr	5kr	5Kr	-	1/5Kr [2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr , 10/20Fr[2, 3]	TARIF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr ,14/20Fr[2, 3]	TARIF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr , 7/20Fr [1,2, 3]	TARIF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr,9/2x10Fr , 9/20Fr[2,3]	TARIF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr , 11/20Fr[2,3]	TARIF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr , 6/20Fr[2, 3]	TARIF 6	
	1Fr	5Fr	20Fr	20Fr			
Italy	500L	500L	500L	-	1/500L [2]	ITALY 1	
					1/2x500L, 3/4x500L [1,2]	ITALY 2	
Spain	100P	-	500P	-	1/100P, 6/500P [2]	SPAIN	
	25P	-	100P	-	1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥ [2]	JAPAN	
Chile	Token	-	Token	-	1/1Token [2]	CHILE	
Denmark	1Kr	5Kr	10Kr	-	1/2x1 Kr, 3/5Kr, 7/10Kr [2]	DENMARK	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka [2]	FINLAND	
New Zealand	$1.00	-	$2.00	-	1/$1, 3/$2	NEW ZEALAND	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10c	10c	10c	-	1/1 Token [2]	ARGENTINA	
Hungary	10F	10F	20F	-	1/1x20F, 1/2x10F, 3/2x20F [2]	HUNGARY	

Note: 1. Factory Delault. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.
* Only il Bill Acceptor and Center Coin Chute are available.

A.4 H.S.T.D. Adjustments

A.4 01 **Highest Scores**

The game maintains a record of the four highest scores achieved to date.

OFF - No high scores are recorded, or displayed.
ON - The four highest scores are stored in memory and displayed in the Attract Mode.

A.4 02 **H.S.T.D. Award**

The award given for achieving the High Score To Date, or the Champion H.S.T.D.: Credit or a Ticket.

A.4 03 **Champion H.S.T.D.**

The "Highest" High Score can be displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

ON - The "Highest" High Score is retained in memory and displayed.
OFF - The "Highest" High Score is not retained.

A.4 04 **Champion Credits**

The number of credits or tickets awarded for a Grand Champion Score. Range: 00 to 10.

A.4 05 **H.S.T.D. 1 Credits**
A.4 06 **H.S.T.D. 2 Credits**
A.4 07 **H.S.T.D. 3 Credits**
A.4 08 **H.S.T.D. 4 Credits**

The number of credits or tickets awarded whenever a player exceeds the first, second, third, or fourth highest score. Range: 00 to 10.

A.4 09 **High Score Reset Every**

The number of games to be played before an automatic reset of the displayed 'Highest Score: occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. Range: OFF (disabled); 250 to 20,000.

A.4 10 **Backup Champion**

The Back-up Grand Champion Score. Range: 00 to 999,000,000.

A.4 11 **Backup H.S.T.D. 1**
A.4 12 **Backup H.S.T.D. 2**
A.4 13 **Backup H.S.T.D. 3**
A.4 14 **Backup H.S.T.D. 4**

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 999,000,000.

A.5 Printer Adjustments (optional board required)

A.5 01 **Column Width**
The column width to be printed. Range: 22 to 80.

A.5 02 **Lines Per Page**
The amount of lines per page. Range: 20 to 80.

A.5 03 **Pause Every Page**
Choose whether the printer pauses at the end of a page.

YES	-	The printer does pause.
NO	-	The printer doesn't pause.

A.5 04 **Printer Type**
Select the type of printer: Parallel, Serial or ADP.

A.5 05 **Serial Baud Rate**
Select which baud rate to use for serial or ADP communications (bit rate): 300, 600, 1200, 2400, 4800, or 9600.

A.5 06 **Serial D.T.R. (Data Terminal Ready)**
When a serial printer is used, this line may be connected to a printer output line signaling that the printer is busy.

NORMAL	-	Normal D.T.R. signal goes low to indicate the printer is not ready.
INVERTED	-	Inverted D.T.R. (busy) signal goes high to indicate the printer is not ready.
IGNORE	-	D.T.R. signal is ignored.

ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, once the game has been operating for an extended period, the display may signal with a message, "Press ENTER for Test Report". This indicates that the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or ≈30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep your game earning, until the service technician can repair the problem.

To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

Pinball Missing.

This game normally uses three balls; however, it will operate with one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough switches or the Ball Shooter switch.

xxxxx Sw. Is Stuck On.

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

Ground Short Row-N, Wht-xxx.

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:
1. Slam tilt (or other coin door switch) touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hangers, etc.) into the game.
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part.
5. All switches in a row closing at the same time. *Note:* This is NOT a switch problem; however, for most games it is a very rare possibility.

U6 Checksum Error.

The game ROM checksum is invalid. If this occurs replace the game ROM.

Time and Date Not Set.

The real time clock is not running. Go to U.4 of the Utilities Menu and set the time and date.

Factory Settings Restored.

This message indicates that the CMOS RAM (U8) no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. (Readings taken with an analog meter.)This message can also indicate that there is an open diode on a 50V coil and noise is entering the circuit.

Top Right Ramp DOWN ERROR
Top Right Ramp UP ERROR

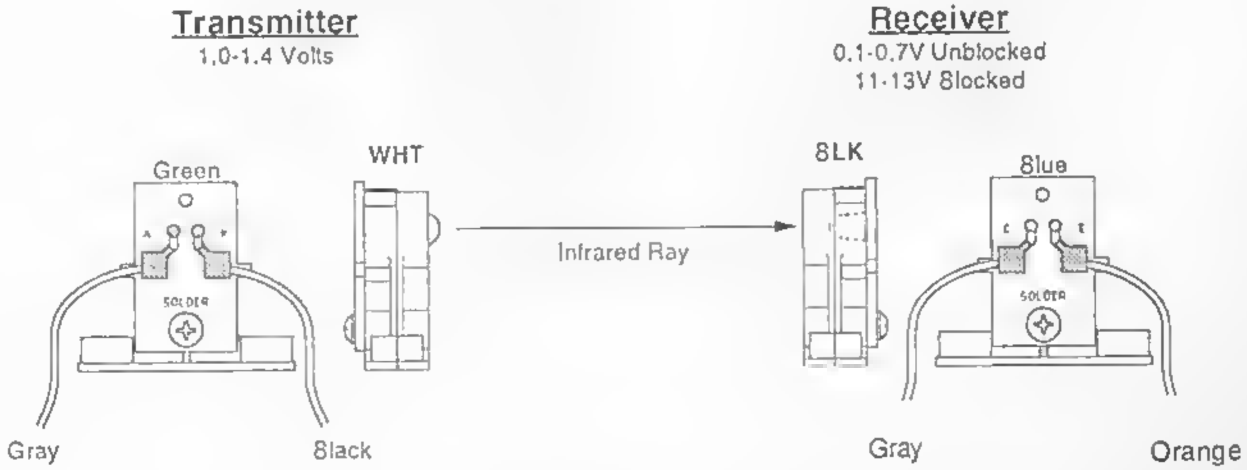
The trap door did not get to its intended position. Go to "T14 Top Right Ramp Test" and check the RAMP DOWN switch, the ramp linkage and the coils for proper operation.

Magnet Left Error
Magnet Right Error
Magnet Power Error
Magnet Load Error
Magnet Unload Error

The Magnet unit had a problem.
Left or right errors are most likely switch problems.
Power errors usually means a loose wire or connector to magnet.
Load error can mean a faulty shooter ramp, a ball on the magnet opto, or no ball in the trough.
Unload error can mean faulty "Ball On Magnet" opto (sw. #82), left gate, right gate opto or right gate.

Opto Theory

The opto receiver (detector) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (emitter L.E.D.) should always be approximately 1.4 volts. *Note:* The transmitter (L.E.D.) is larger than the receiver (it protrudes further from its case).



CPU L.E.D.'s

The CPU has three L.E.D.s located on the upper left side of the board D19, D20, and D21. On game power-up D19 and D21 turn On for a moment then, D19 turns Off and D20 starts to blink rapidly. D21 remains On. The system has detected a problem if the following happens:

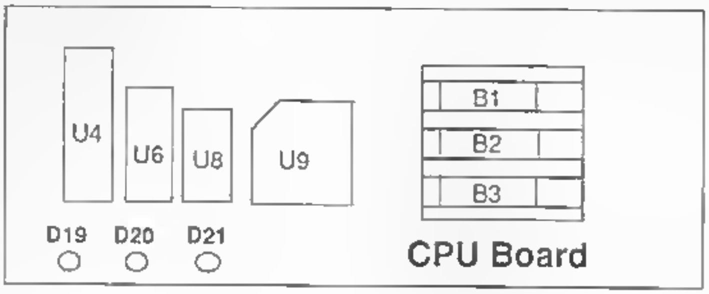
CPU Board L.E.D. Error Codes

Center L.E.D. blinks one time - U6 ROM Failure
Center L.E.D. blinks two times - U8 RAM Failure
Center L.E.D. blinks three times - U9 Custom Chip Failure

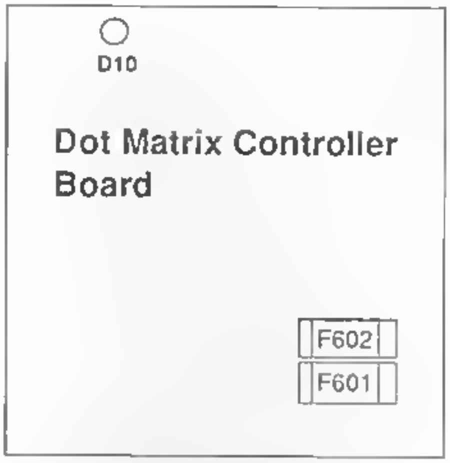
Sound Board Beep Error Codes
Upon Game Turn-On:

1 Beep = Sound Board O.K.
2 Beeps = U9 Failure (RAM)
3 Beeps = U18 Failure (ROM)
4 Beeps = U15 Failure (ROM), if used
5 Beeps = U14 Failure(Masked ROM), if used

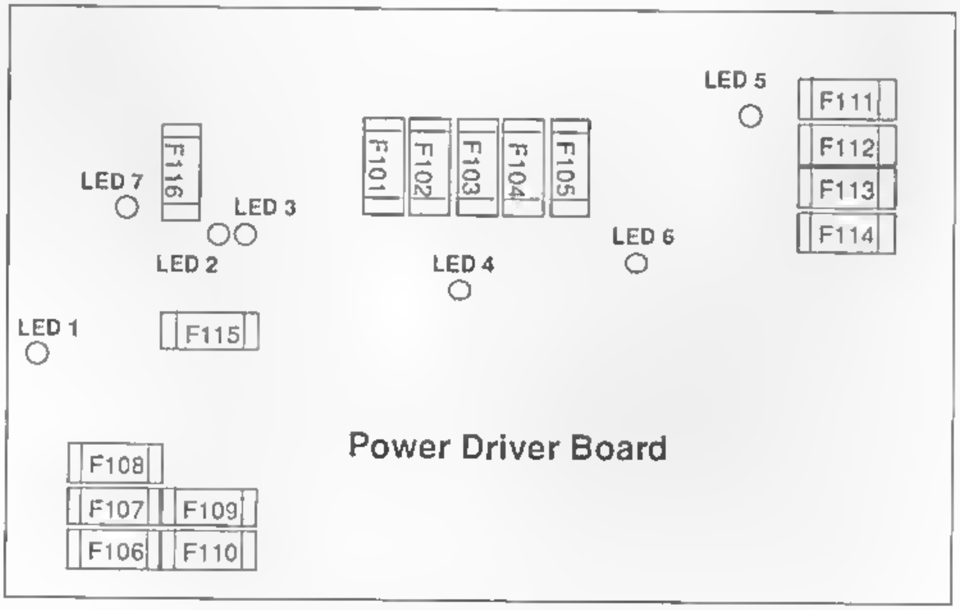
LED List


U4
U6
U8
U9
B1
B2
B3
D19
D20
D21
CPU Board

CPU Board
D19 , Blanking
D20, Diagnostic
D21, +5vdc
At game Turn-On = D19 & D21 On, D20 Off
During Normal Operation = D19 Off, D20 Flashing, D21 On

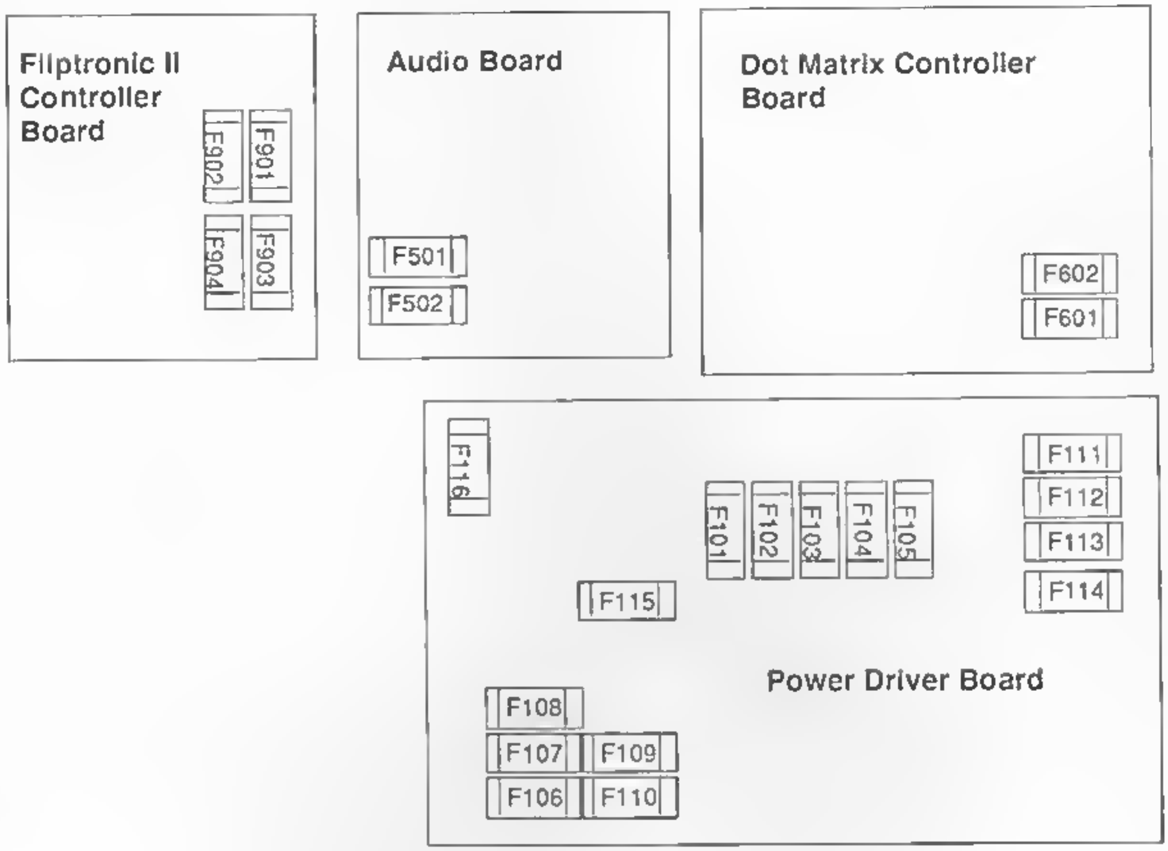

D10
Dot Matrix Controller Board
F602
F601

Dot Matrix Controller Board
D10, +5V Circuit, Normallly On


LED 5
F111
F112
F113
F114
F116
F101
F102
F103
F104
F105
LED 7
LED 3
LED 2
LED 4
LED 6
LED 1
F115
Power Driver Board
F108
F107
F109
F106
F110

Power Driver Board
LED 1, +12vdc Switch Circuit, Normally On
LED 2, High/Low Line Voltage Sensor, Normally On
LED 3, High/Low Line Voltage Sensor, Normally Off
LED 4, +5vdc, Digital Circuit, Normally On
LED 5, +20vdc, Flashlamp Circuit, Normally On
LED 6, +18vdc, Lamps Circuit, Normally On
LED 7, +12vdc, Power Circuit (motors relays etc.), Normally On

Fuse List


Fliptronic II Controller Board
F902
F901
F904
F903
Audio Board
F501
F502
Dot Matrix Controller Board
F602
F601
F116
F111
F112
F113
F114
F101
F102
F103
F104
F105
F115
Power Driver Board
F108
F107
F109
F106
F110

Audio Board
F501 -25V Circuit, 3A, S.B.
F502 +25V Circuil, 3A, S.B.

Dot Matrix Controller Board
F601 +62V Circuit, 3/8A, S.B.
F602 -113V and -125V Circuits, 3/8A, S.B.

Power Driver Board
F101 Left Flipper, 3A, S.B. Not Used
F102 Right Flipper, 3A, S.B. Not Used
F103 Solenoid #25-#28, 3A, S.B.
F104 Solenoid #9-#16, 3A, S.B.
F105 Solenoid #1-#8, 3A, S.B.
F106 G.I. #5 Wht-Vio, 5A, S.B.
F107 G.I. #4 Wht-Grn, 5A, S.B.
F108 G.I. #3 Wht-Yel, 5A, S.B.
F109 G.I. #2 Wht-Org, 5A, S.B.
F110 G.I. #1 Wht-Brn, 5A, S.B.
F111 Flasher Secondary, 5A, S.B.
F112 Solenoid Secondary, 7A, S.B.
F113 +5V Logic, 5A, S.B.
F114 +18V Lamp Matrix, 8A, N.B.
F115 +12V Switch Matrix, 3/4A, S.B.
F116 +12V Secondary, 3A, S.B.

Fliptronic II Controller Board
F901 Upper Left Flipper, 3A, S.B.
F902 Upper Right Flipper, 3A, S.B.
F903 Lower Left Flipper, 3A, S.B.
F904 Lower Right Flipper, 3A, S.B.

Line Filter
Domestic Game 8A, N.B.
Foreign Game 5A, S.B.

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Release mechanism are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar to the Ball Release device, and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of the Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, with a Williams' part number of E1165, is a recommended lubricant.

SWITCH CONTACTS

Playfield Switches

For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

Flipper Switches

This game uses the new Fliptronic II Electronic Flipper System. The End-of-Stroke switches are NORMALLY OPEN. The switch should close when the flipper is energized. All E.O.S. switches and flipper button cabinet switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NOT REPLACE these switches with the old style tungsten high current type switches as intermittent operation could occur. **Note:** Unlike the old style of flipper, an E.O.S. switch failure does not harm the flipper. The game notifies the operator of the switch being mis-adjusted in the test report, but continues to play. The E.O.S. switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

CLEANING

Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.

MAGNET and the LONG BEAM OPTO SWITCH

Even though the magnet does not need to rest against the Magnet Left side switch (#81) or the Magnet Right side switch (#83) it is recommended that the switches be adjusted so that the magnet does rest against each side. This eliminates any marginal switch adjustments.

The Ball On Magnet switch (#82) is a long beam opto and does not function like a short beam opto. With the short beam optos, the transmitter is always "on" and the receiver detects this constant "on" beam and produces a voltage drop. The long beam opto transmits a modulated 40Khz (40,000 hertz) infrared beam, and the receiver detects this signal (much like an AM radio, or a remote control for a TV). Simply checking for voltages on the receiver and transmitter of long beam optos DOES NOT ensure proper operation.

The long beam opto, Ball On Magnet switch (#82), is a critical switch. Failure of this device can lead to false "end of ball" conditions or multiple balls on the playfield (just like a bad trough switch). This also can confuse or mislead the error messages relating to the magnet. It is vital that this opto switch function correctly. If it cannot be made functional, then disable the magnet unit by using Feature game adjustment A.2 42 until it can be fixed. Setting this adjustment to DISABLE causes the game to ignore the magnet unit and start Mist Multiball via the Mist Multiball shot.

The long beam opto can reflect under the ball when the ball is in the middle of the playfield. The anti-reflection "L" bracket in the left pocket eliminates most of this reflection and software eliminates the rest.

The long beam opto sender LED (white case) should be adjusted toward the front of the game. It can be adjusted by loosening the three screws that hold the white case in place then sliding the device toward the front of the game.

MAGNET and the SHORT BEAM OPTO SWITCHES

From the Magnet test, enter the sub-test Opto Check 1. The controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered. If there is any flasher or lamp interference in this test, the most common problem is that the sending LED and/or the receiving opto has moved in its white/black plastic housing and are NOT pointing at each other. Both should be firmly soldered to their PC boards, without any exposed wires between the device and the PC board. Other problems can be that either plastic housing is not pointing at each other.

From the Magnet test, enter the sub-test Opto Check 2. As in sub-test Opto Check 1, the controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered. If there is any flasher or lamp interference in this test, the most likely problem is that the ground of the shielded cable is not grounded properly.

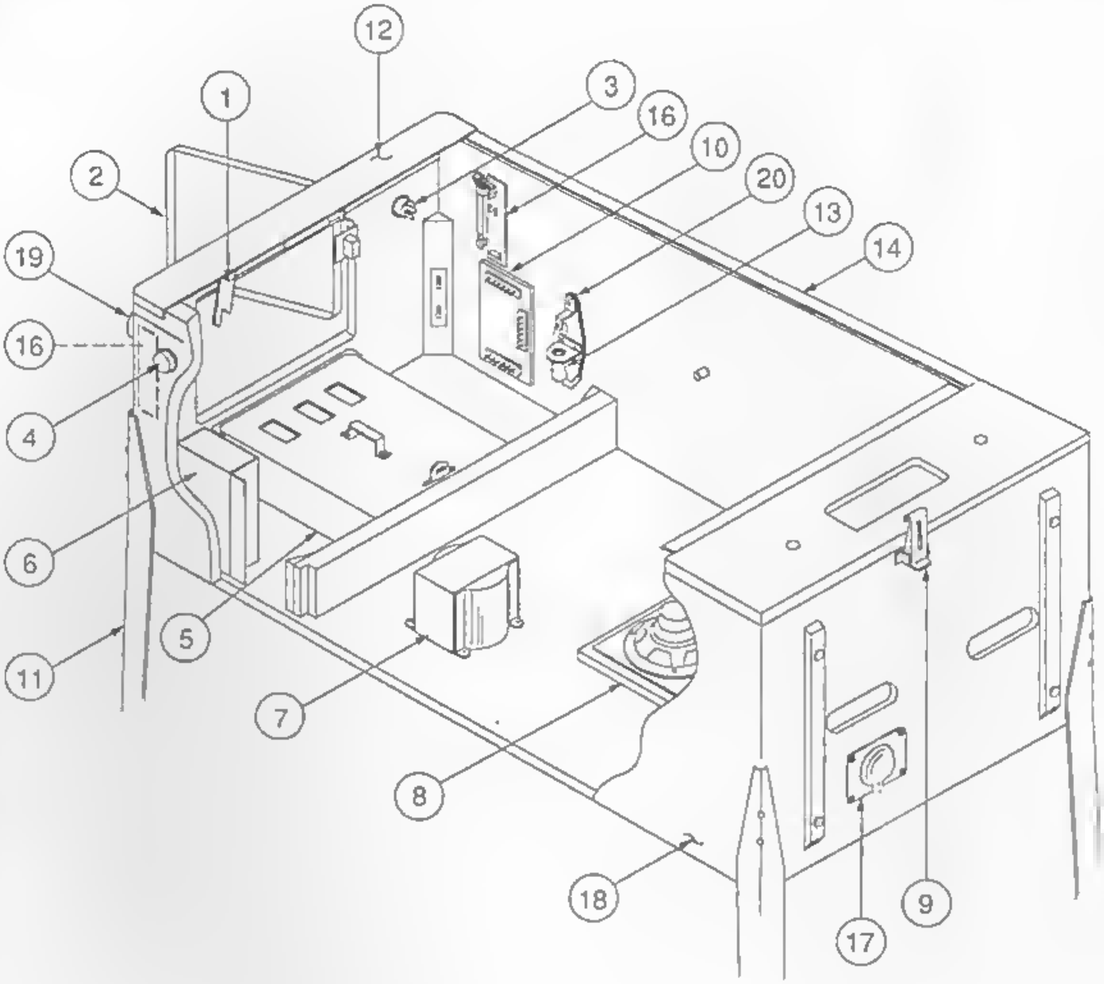
Section 2

Parts Information

Line Filter/Cordset Application Chart

	LINE FILTER ASSY.			CORDSET								
COUNTRY	A-15707-120V	A-15707-230V		5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	H-15756
UNITED STATES	●			●								
CANADA	●			●								
TAIWAN	●			●								
MEXICO	●			●								
CENTRAL AMERICA	●			●								
SOUTH KOREA	●			●								
PUERTO RICO	●			●								
AUSTRIA		●			●							
BELGIUM		●			●							
FINLAND		●			●							
FRANCE		●			●							
GREECE		●			●							
HOLLAND		●			●							
HUNGARY		●			●							
NETHERLANDS		●			●							
NETH. ANTILLES		●			●							
NORWAY		●			●							
POLAND		●			●							
PORTUGAL		●			●							
SPAIN		●			●							
SWEDEN		●			●							
TURKEY		●			●							
WEST GERMANY		●			●							
UNITED KINGDOM		●				●						
IRELAND		●				●						
HONG KONG		●				●						
DENMARK		●					●					
ITALY		●						●				
CHILE		●						●				
PEOPLE'S REP. OF CHINA		●						●				
SWITZERLAND		●							●			
AUSTRALIA		●								●		
NEW ZEALAND		●								●		
ARGENTINA		●								●		
JAPAN	●										●	●

Cabinet Parts



Cabinet Parts:

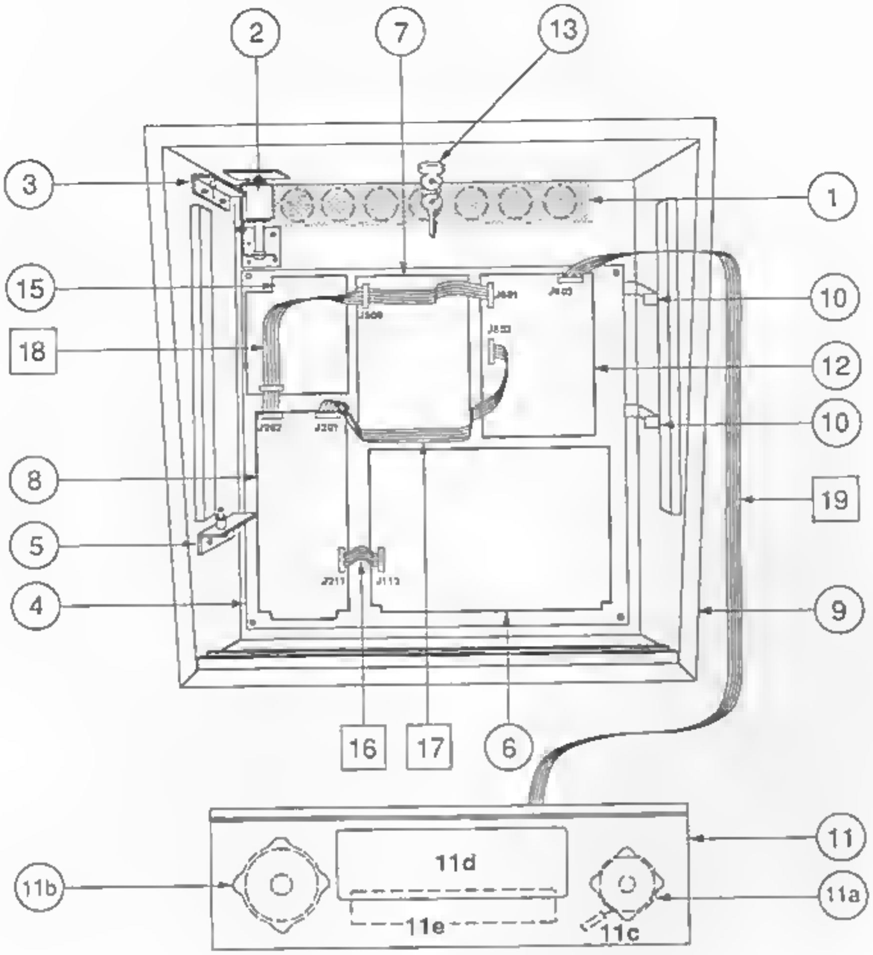
Item	Part Number	Description
1.	D-9174-3	Lever Guide Assembly
2.	A-14148-1	Coin Door - 2 Slot
3.	20-9663-1	Start Button
4.	B-12273-4	Flipper Button - Red (2 Used)
5.	A-16367-1	Cashbox Assembly
6.	*	Line Filter Assembly
7.	5610-12835-00	WPC Transformer, 115/230v
8.	5555-12929-00	Speaker, 4Ω, 6", 25w
9.	20-9347	Toggle Latch
10.	A-14689	WPC Coin Door Interface Bd.
11.	C-10843	Metal Leg Assembly
12.	D-12615	Front Molding Assembly
13.	20-6502-A	Plum Bob
14.	A-12359-3	Side Molding Assembly
15.	*	Cordset
16.	A-15878	Double Opto Assy. (2 Used)
17.	01-10714	Line Cord Cover
18.	11-1067-50001	Wood Cabinet
19.	A-15896-1	Lit Sw. Button Assembly
20.	A-15361	Tilt Mechanism Assembly

* See Application Chart (p.2-2).

Miscellaneous Parts:

08-7028-T	Tempered Playfield Glass: 21" x 43"
20-6500	Steel Ball, 1-1/16" (4)

Backbox Assembly



Item	Part Number	Description
1.	01-6645	Venting Screen
2.	B-10686-1	Knocker & Bracket Assy.
3.	A-12497	Upper Insert Bd Hinge Assy.
4.	A-14092-3	Mounting Plate Assembly
5.	A-12498	Lower Insert Bd Hinge Assy.
6.	A-12697-1	Power Driver Assembly
7.	A-12738-50001	WPC Sound Board
8.	A-12742-50001	WPC CPU Board
9.	A-14376-50001	Backbox Assembly
10.	01-9047	Insert Stop Bracket
11.	A-16254	Speaker / Display Assy.
a)	5555-12924-00	Speaker, 4Ω, 15w
b)	5555-12856-00	Speaker, 5-1/4", 4Ω, 25w
c)	5045-12914-00	Cap., 10μfd., 50v, (±20%)
d)	5901-12784-00	Dot Matrix Display/Driver Bd.
e)	A-16424	3-Flash Lamp PCB Assy.
12.	A-14039	Dot Matrix Contoller Board
13.	A-13379	Lock & Plate Assembly
a)	20-9637	Lock & Cam Kit

Item	Part Number	Description
14.	50001-IN	Insert Board
15.	A-15472	Fliptronic II Board

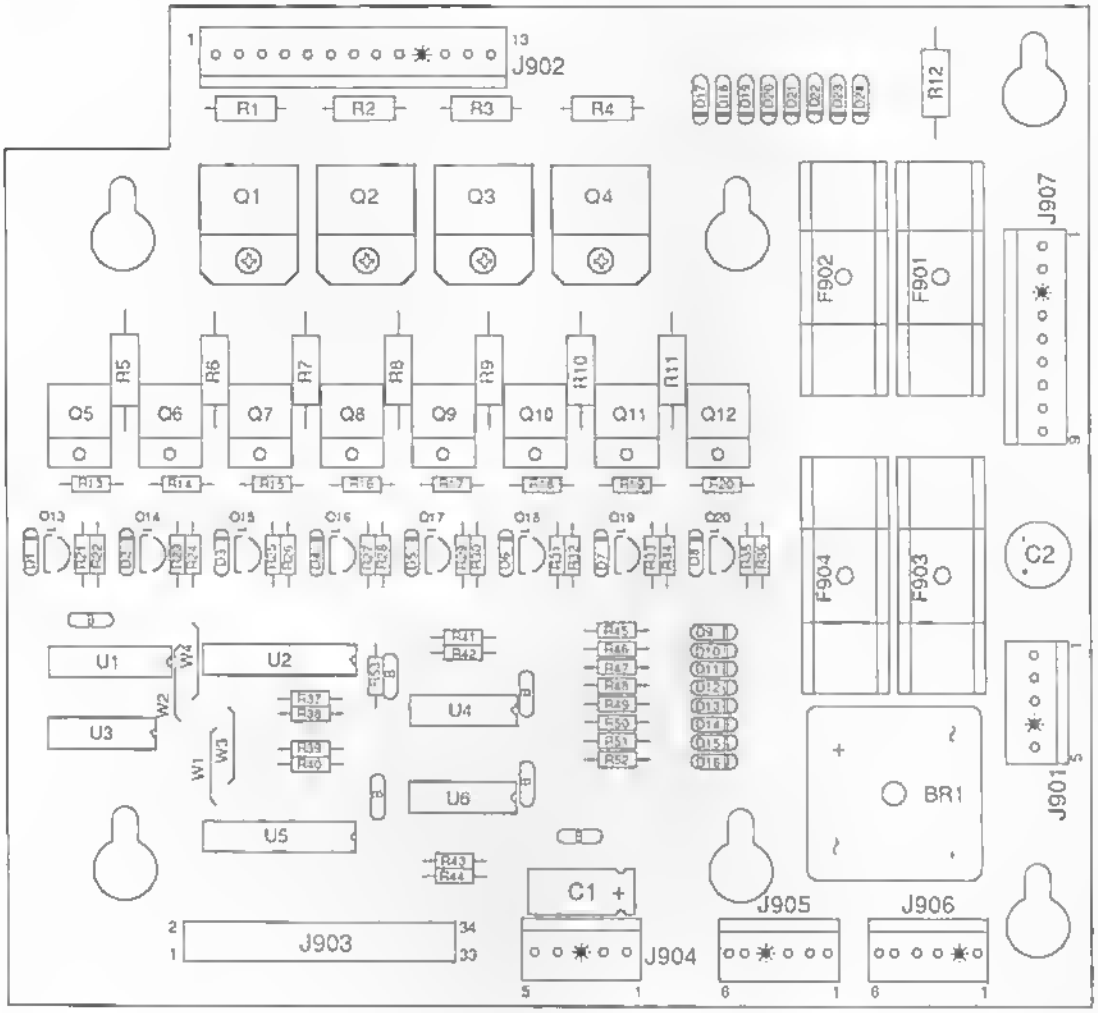
Ribbon Cables:

16.	5795-12653-03	Ribbon Cable, 3"
17.	5795-13018-00	Ribbon Cable, 22"
18.	5795-10938-14	Ribbon Cable, 14"
19.	5795-12838-30	Ribbon Cable, 30"

Miscellaneous Parts:

A-8552-50001	Tempered Backglass Assy.
08-7456	Backbox Glass: 27" x 18-7/8"
31-1357-50001	Screened Translight
03-8228-2	Glass Channel Top (1)
03-8228-3	Glass Channel Edge (2)
03-8229-1	Glass Lift Channel (1)

A-15472 Fliptronic II Board



J902
1
13
R1
R2
R3
R4
D17
D18
D19
D20
D21
D22
D23
D24
R12
Q1
Q2
Q3
Q4
J907
F902
F901
R5
R6
R7
R8
R9
R10
R11
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
9
R13
R14
R15
R16
R17
R18
R19
R20
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
C2
F904
F903
U1
U2
U3
U4
U5
U6
W1
W2
W3
R37
R38
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
R52
D9
D10
D11
D12
D13
D14
D15
D16
B
+
BR1
J901
5
C1 +
J903
2
1
34
33
J904
5
1
J905
6
1
J906
6
1

Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink
20-9684	Q5-Q12	Fastener Snap
4006-01003-08	Q1-Q4	Mach. Screw, 6-32
4406-01128-00	Q1-Q4	Nut 6-32 KEPS
5010-09034-00	R37 - R44, R53	Resistor, 10KΩ, 1/4w, 5%
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52	Resistor, 1KΩ, 1/4w, 5%
5010-09361-00	R1 - R4	Resistor, 220Ω, 1/2w, 5%
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Resistor, 470Ω, 1/4w, 5%
5010-09534-00	W3, W4	Resistor, 0Ω
5010-10171-00	R13 - R20	Resistor, 56Ω, 1/4w, 5%
5011-12956-00	R5 - R12	Resistor, 2.7KΩ, 1w, 5%
5040-08986-00	C1	Capacitor, 100M, 10v
5043-08980-00	B	Capacitor, .01µF, 50v
5040-09537-00	C2	Capacitor, 100µF, 100v

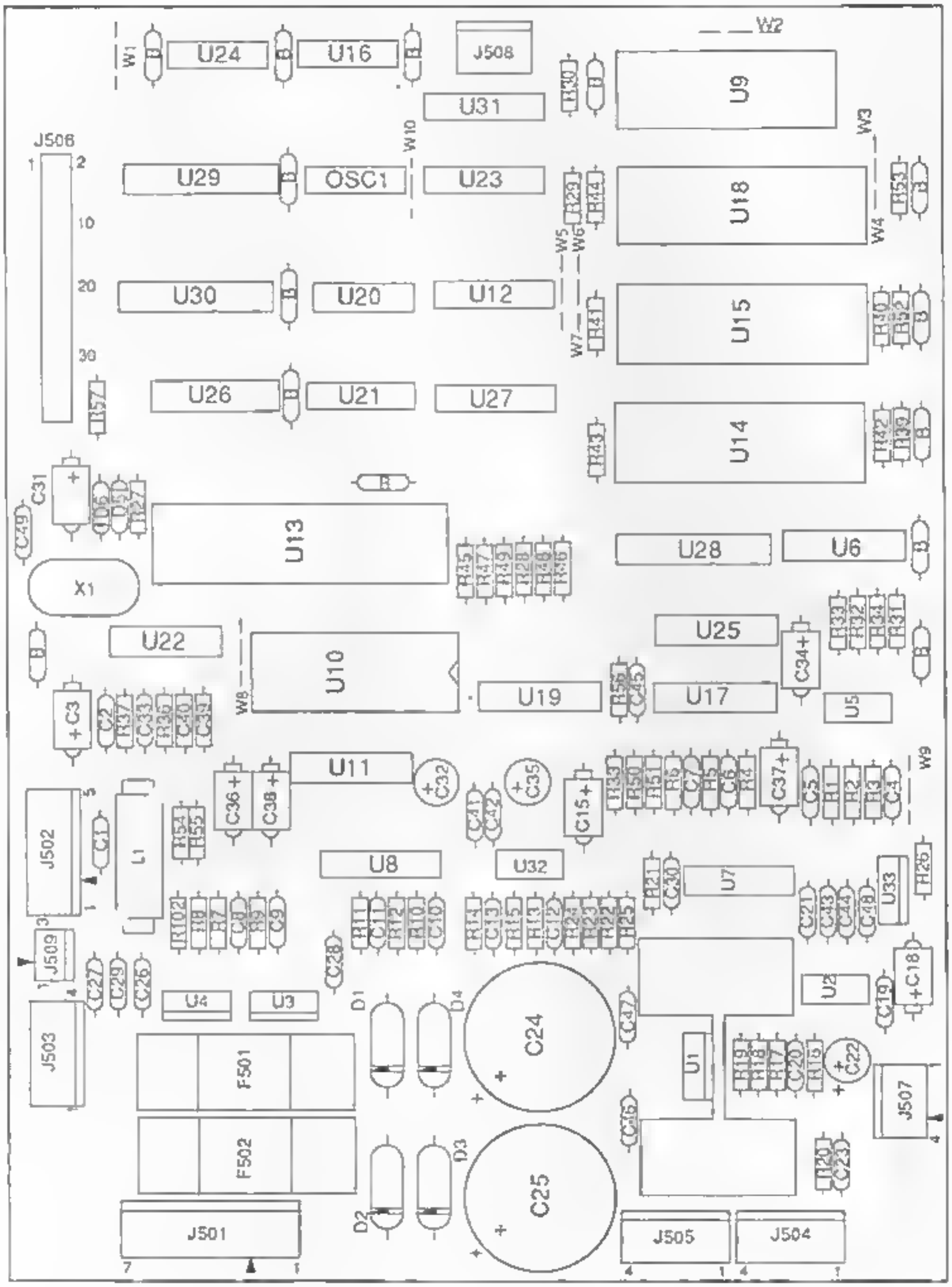
Part Number	Designator	Description
5070-09054-00	D1 - D24	Diode1N4004
5162-12635-00	Q5-Q12	Transistor TIP102 NPN
5190-09016-005	Q13 - Q20	Transistor 2N4403 PNP
191-12179-00	Q1-Q4	Transistor TIP36C PNP
5315-12009-00	U2	IC 74HCT374
5315-12031-00	U5	IC 74HCT244
5315-12812-00	U1	IC 74HCT138
5315-12951-00	U3	IC 74HCT00
5370-12272-00	U4, U6	IC LM339 QUAD COMP
5791-10862-09	J907	Connector, 9-pin Header Sq. Pin
5791-10862-05	J901, J904	Connector, 5-pin Header Sq. Pin
5791-10862-13	J902	Connector, 13-pin Header Sq. Pin
5791-12461-06	J905, J906	Connector, Str Sq. Pin Header .100
5791-12516-00	J903	34 HEN 2x17 STR
5100-09690-00	BR1	Bridge Rectifier
5731-10356-00	F901 - F904	Fuse S-B, 3A., 250v
5733-12060-01	-	Fuse Holder (F901-F904)

A-12738-50001 WPC Audio Board

Part No.	Designator	Description
01-9980		Shield: Wire Protector
4004-01005-06	U1	Mach. Screw, 4-40 x 3/8
4104-01012-04	U1	Sh. Mach. Screw, #4 x 1/4
4404-01119-00	U1	Nut, 4-40 SNUT
5010-08772-00	R21	Resistor, 15KΩ, 1/4w, 5%
5010-12065-00	R22, R25	Resistor, 120KΩ, 1/4w, 5%
5010-08991-00	R51	Resistor, 4.7KΩ, 1/4w, 5%
5010-10987-00	R23, R24	Resistor, 56KΩ, 1/4w, 5%
5010-09034-00	R13, R14, R29-R31, R33, R34, R50, R45-R49	Resistor, 10KΩ, 1/4w, 5%
5010-09035-00	R4	Resistor, 47KΩ, 1/4w, 5%
5010-09036-00	R35	Resistor, 100Ω, 1/4w, 5%
5010-09134-00	R1, R2, R6, R8, R9, R11,R12	Resistor, 150KΩ, 1/4w, 5%
5010-09162-00	R26, R102	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R3, R5, R17, R19	Resistor, 22K, 1/4w, 5%
5010-09269-00	R15	Resistor, 12KΩ, 1/4w, 5%
5010-09358-00	R18, R32	Resistor, 1KΩ, 1/4w, 5%
5010-09416-00	R28, R36, R37, R39-R44 R52, R53, R57	Resistor, 470Ω, 1/4w, 5%
5010-09534-00	W3, W5, W7-W10	Resistor, 0Ω
5010-10171-00	R38, R56	Resistor, 56Ω, 1/4w, 5%
5010-10258-00	R16	Resistor, 1M, 1/4w, 5%
5010-10650-00	R7, R10	Resistor, 62K, 1/4w, 5%
5010-10989-00	R54, R55, R27	Resistor, 470K, 1/4w, 5%
5010-12752-00	R20	Resistor, 1Ω, 1/4w, 5%
5040-08986-00	C3	Capacitor, 100M, 10v (±20%)
5040-09332-00	C15, C18, C34, C36, C38	Capacitor, 47μfd., 25v, Axial
5040-11036-00	C32, C35	Capacitor, 47μfd., 16v, Rad
5040-12729-00	C24, C25	Capacitor, 4700μfd., 35v.
5040-12750-00	C22	Capacitor, 22μfd., 35v, Rad.
5041-09031-00	C26-C29, C37, C46-C48	Capacitor, 1μfd. TANT
5041-09243-00	C20, C21	Capacitor, 10μfd. TANT
5043-08980-00	C41-C44, B(15)	Capacitor, .01M, 50v, (+80, -20)
5043-08996-00	C1, C2	Capacitor, .1μfd., 50v, 10%
5048-11027-00	C8, C10	Capacitor, 33pfd., 50v, 10%
5048-11028-00	C45	Capacitor, 22pfd., 50V, Axial
5048-11029-00	C33, C49	Capacitor, 100pfd., 50v
5048-11030-00	C12	Capacitor, 470pfd., 50v
5048-11031-00	C19, C31	Capacitor, .001μfd., 50v, 10%
5048-11065-00	C13	Capacitor, .0022μfd., 50v, 10%, Ax.
5048-11072-00	C39, C40	Capacitor, .0033μfd.
5048-12036-00	C23	Capacitor, .22μfd., 10v, Ceramic
5048-12745-00	C4, C6	Capacitor, 1800pfd., 50V, 10%
5048-12746-00	C5, C7	Capacitor, 330pfd., 50V
5048-12748-00	C9, C11, C30	Capacitor, 220pfd., 50V

Part No.	Designator	Description
5070-08919-00	D5, D6	Diode, 1N4148
5070-09045-00	D1-D4	Diode MR501, 3.0A
5250-10495-00	U3	Reg. 7912 1.0A -12v.
5281-09215-00	U22	IC, 74LS04 Hex INV
5281-09246-00	U12	IC, 74LS139 2-4 Dec.
5281-09486-00	U28-U30	IC, 74LS374 8 Dual Flipflop
5281-09487-00	U6, U23-U25	IC, 74LS74 Dual Flipflop
5281-09500-00	U31	IC, 74LS32
5281-09745-00	U26, U27	IC, 74LS138 DMLTPX
5281-09850-00	U20	IC, 74LS11 Tripple AND
5281-10577-00	U16	IC, 74LS125 Q/B Bfr
5370-11086-00	U10	IC, YM2151 Sound
5371-11087-00	U11	IC, YM3012 D/A
5400-10320-00	U13	IC, MPU 68B09E
5284-12651-00	U21	IC 4584
5340-12278-00	U9	S/Ram 2064
5370-09691-00	U17	IC, 55536 CVSD
5370-12260-00	U2	IC, 3340 Elec Atten
5370-12728-00	U1	IC, Audio Amp LM1875
5370-12730-00	U7, U8	IC, Op Amp TL084
5370-12742-00	U32	IC, Op Amp TL082
5371-12727-00	U19	Dac AD7524
5432-12726-00	U5	EE Prom Pot X9503
5460-12423-00	U4	IC, LM7812
5460-12743-00	U33	LM7809 TO-220
5520-09020-00	X1	Crystal, 3.58 MHz.
5521-10931-00	OSC1	Oscillator, 8.0 MHz.
5551-09822-00	L1	Ind, 4.7UH 3.0A
5700-08985-00	U13	Socket, IC 40-pin, .6"
5700-09004-00	U10	Socket, IC 24-pin, .6"
5700-09006-00	U11	Socket, IC 16-pin, .3"
A-5343-50001-2	U14	IC, Audio ROM
A-5343-50001-3	U15	IC, Audio ROM
A-5343-50001-4	U18	IC, Audio ROM
5700-12088-00	U1	Socket, IC 32-pin (U15, U18)
5705-12755-00		Heatsink 5299B-220
5731-10356-00	F501, F502	Fuse, 3A, S-B, 250v
5733-12060-01		Fuse Holder (F501, F502)
5791-10862-04	J504, J505	Connector, 4-pin Header Sq. .156
5791-10862-05	J502	Connector, 5-pin Header Sq. .156
5791-10862-07	J501	Connector, 7-pin Header Sq. .156
5791-12462-03	J509	Connector, 3-pin Header Sq. .100
5791-12462-04	J508	Connector, 4-pin Header Sq. .100
5791-12516-00	J506	34 Hen 2x17 STR

A-12738-50001 WPC Audio Board

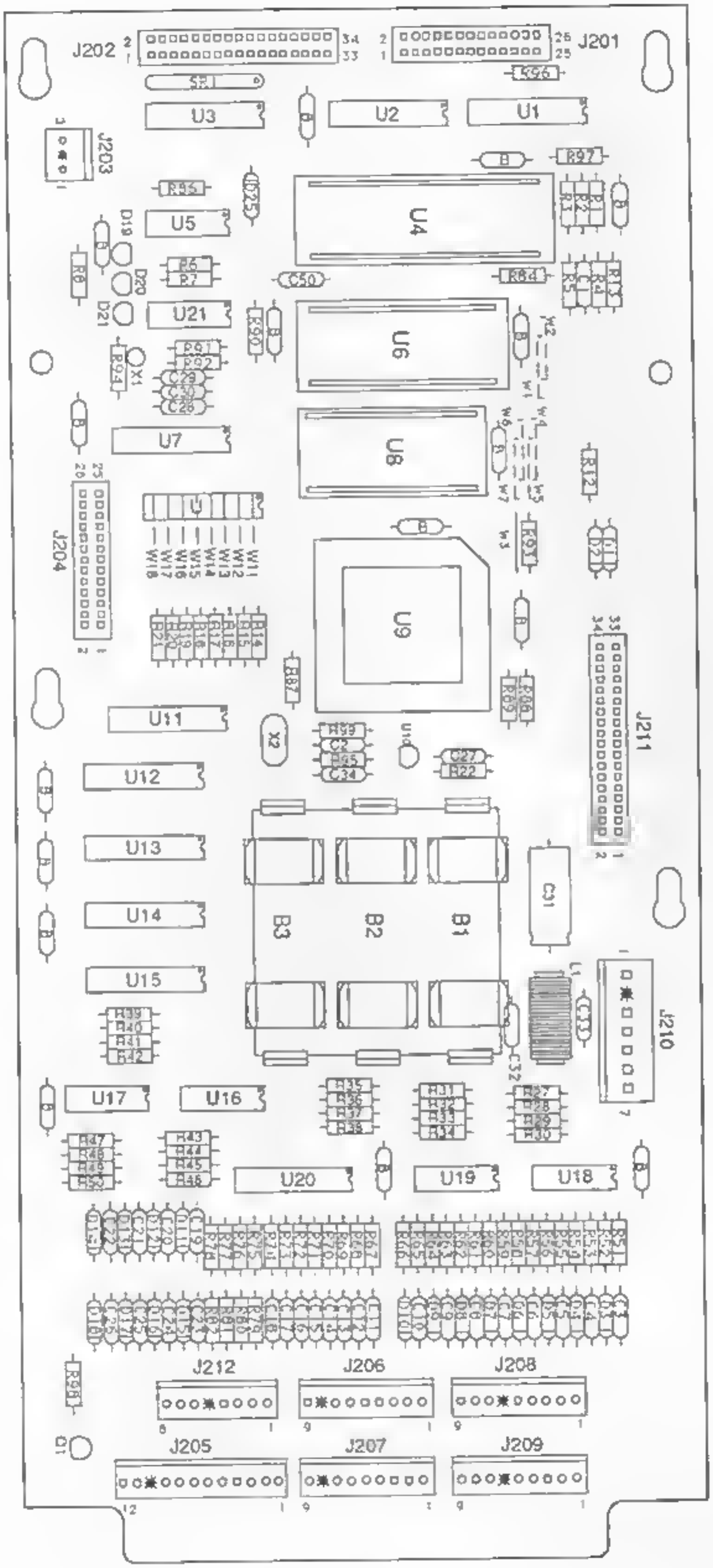


W1
U24
U16
J508
W2
U31
R30
U9
W3
J506
W10
U29
OSC1
U23
R29
R44
U18
R53
W4
W5
W6
U30
U20
U12
R41
U15
R40
R52
W7
U26
U21
U27
R57
R43
U14
R42
R39
C31
C49
D5
D51
R27
U13
R45
R47
R49
R28
R48
R46
U28
U6
X1
U22
U10
W8
U25
C34
R33
R32
R34
R31
U19
R56
C45
U17
U5
C3
C2
R37
C33
R36
C40
C39
U11
C32
C35
C15
R33
R50
R51
C7
R5
C6
R4
C37
C5
R1
R2
R3
C4
W9
J502
C1
L1
C36
C38
R54
R55
C41
C42
U8
U32
R21
C30
U7
U33
R26
R102
R8
R7
C8
R9
C9
C28
R11
C11
R12
R10
C10
R14
C13
R15
R13
C12
R24
R23
R22
R25
C21
C43
C44
C48
J509
C27
C29
C26
U4
U3
D1
D4
C24
C47
U2
C18
C19
J503
F501
U1
R19
R18
R17
C20
R16
C22
J507
C46
F502
D3
C25
D2
R20
C23
J501
J505
J504

A-12742-50001 WPC CPU Board

Item	Part Number	Designator	Description
1	5010-09034-00	R14-R22, R27-R42, R86, R90, R94, R98	Resistor, 10KΩ, 1/4w, 5%
2	5010-09085-00	R1, R2, R4, R93, R96, R97	Resistor, 1.5KΩ, 1/4w, 5%
3	5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Resistor, 1.2KΩ, 1/4w, 5%
4	5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84	Resistor, 1KΩ, 1/4w, 5%
5	5010-09416-00	R5-R8, R12, R13, R87-R89	Resistor, 470Ω, 1/4w, 5%
6	5010-09534-00	W1, W4, W7, W13 - W18	Resistor, 0Ω
7	5010-10258-00	R95, R99	Resistor, .01µfdΩ, 1/4w, 5%
8	5010-10989-00	R92	Resistor, 470KΩ, 1/4w, 5%
9	5010-12104-00	R91	Resistor, 22µfd, 1/4w, 5%
10	5019-09362-00	SIP 1	SIP, 9R, 10-pin, 4.7KΩ, 5%
11	5040-08986-00	C31	Capacitor, 100µfd, 10v (±20%)
12	5043-08980-00	B	Capacitor, .01µfd, 50v, (+80, -20%)
13	5043-09030-00	C27	Capacitor, 0.047µfd, 50v (±20%)
14	5043-09065-00	C3 - C26	Capacitor, 470pfd, 50v (±20%)
15	5043-09491-00	C2, C29, C30, C34	Capacitor, 22pfd, 1KV, (±10%)
16	5043-09492-00	C28	Capacitor, 100pfd, 50v, (±10%)
17	5043-09845-00	C32, C33	Capacitor, 1KP, 50v, (±20%)
18	5070-08919-00	D2 - D18	Diode, 1N4148, 150MA
19	5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
20	5160-10269-00	Q1	Transistor, 2N3904, NPN
21	5162-12422-00	U20	IC, ULN, 2803A
22	5281-09308-00	U3	IC, 74LS245, Octal Bus Trncv
23	5281-09486-00	U14	IC, 74LS374, 8D F/F
24	5281-09851-00	U5	IC, 74LS14, SMT/TRG
25	5281-09867-00	U1, U2, U7	IC, Octal Buffer, 74LS244
26	5281-10182-00	U11, U12, U13, U15	IC, 74LS240 Driver
27	5284-12651-00	U21	IC, 4584
28	5340-12278-00	U8	S/RAM 2064
29	5370-12272-00	U16 - U19	IC, LM339, Quad. Comp
30	5370-12687-00	U10	MC, 34064 Reset Chip
31	5520-10438-00	X2	Crystal, 8.0MHz.
32	5520-12084-00	X1	Crystal 32.768 KHz
33	5551-09822-00	L1	ILN, 4.7 UH 3A
34	5671-09019-00	D19 - D21	DSPL LED RED
35	5700-08985-00	U4	Socket, IC 40P, .6"
36	5700-12088-00	U6	Socket, IC 32P, .6"
37	5700-12424-00	U9	Socket, 84 Pin PLCC
38	5791-10850-00	J201, J204	Connector, 26-pin Header Str Sq.
39	5791-10862-07	J210	Connector, 7-pin Header Str Sq.
40	5791-12461-08	J212	Connector, 8-pin Header Str Sq.
41	5791-12461-09	J206 - J209	Connector, 9-pin Header Sq. pin
42	5791-12461-12	J205	Connector, 12-pin Header Sq. pin
43	5791-12516-00	J202, J211	34 Hen 2x17 STR
44	5881-09021-00	B1 - B3	Battery Holder "AA"
45	5048-11033-00	C50	Capacitor, 0.022µf, 10v
47	A-5343-50001-1	U6	Game PROM Assembly
48	5410-12426-00	U9	WPC-89 ASIC
49	5400-10320-00	U4	IC MPU 68B09E
50	5880-09022-00	B1 - B3	Battery, Alkaline, 1.5v ("AA")

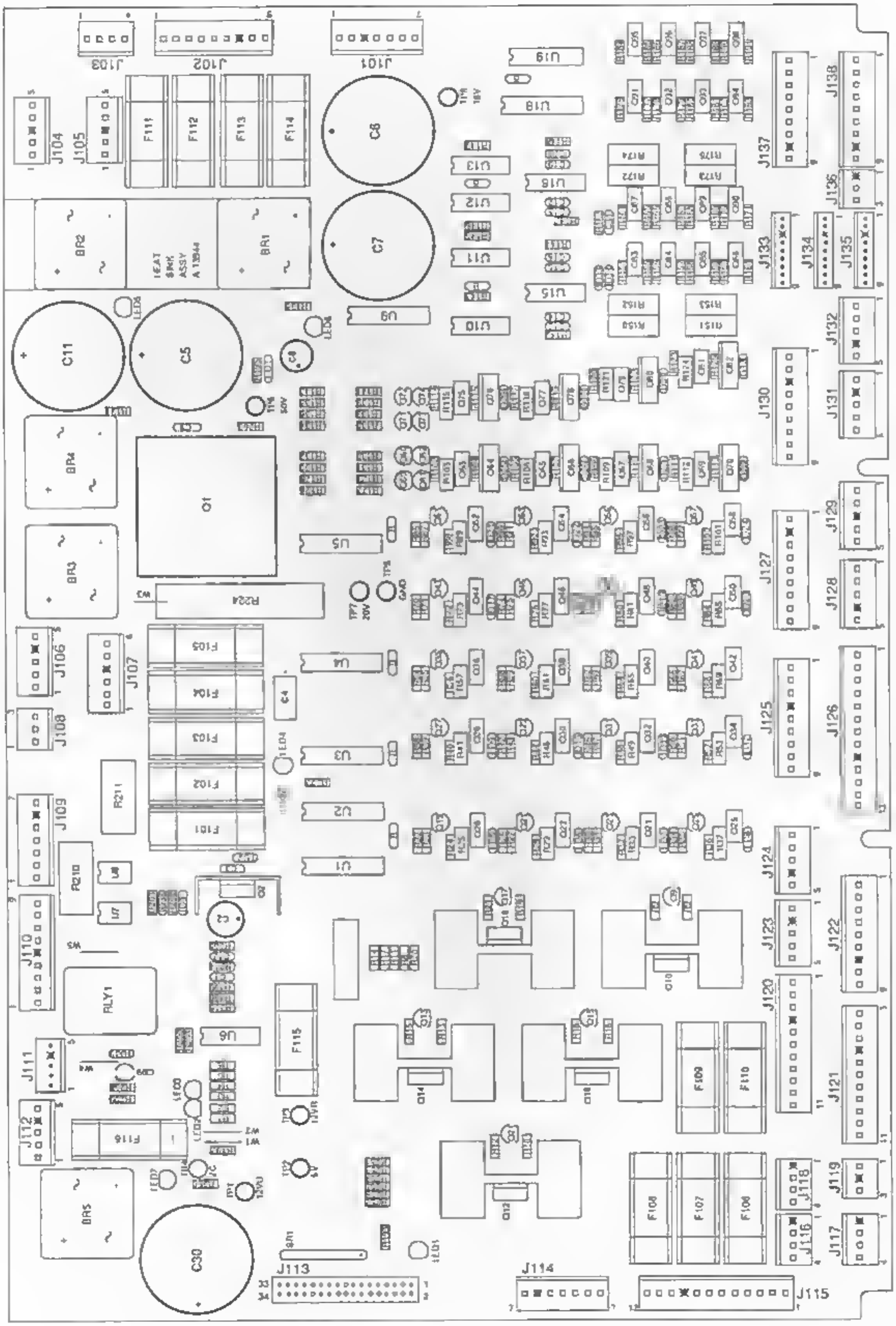
A-12742-50001 WPC CPU Board


J202
J201
SR1
R96
U3
U2
U1
J203
R97
R95
D25
U4
R1
R2
R3
U5
D19
R6
R7
R8
C50
R84
D20
R5
R4
R13
U21
D21
R90
U6
W2
R91
R92
R94
X1
C29
C30
C28
W1
W6
W4
U7
U8
R12
W7
W5
J204
W18
W17
W16
W15
W14
W13
W12
W11
W3
R93
R21
R20
R19
R18
R17
R16
R15
R14
U9
R87
R88
R89
J211
U11
X2
R99
C2
R95
C34
U10
C27
R22
U12
U13
U14
U15
B3
B2
B1
C31
L1
C33
J210
C32
R39
R40
R41
R42
U17
U16
R35
R36
R37
R38
R31
R32
R33
R34
R27
R28
R29
R30
R47
R48
R49
R50
R43
R44
R45
R46
U20
U19
U18
J212
J206
J208
R98
Q1
J205
J207
J209

A-12697-1 WPC Power Driver Assembly

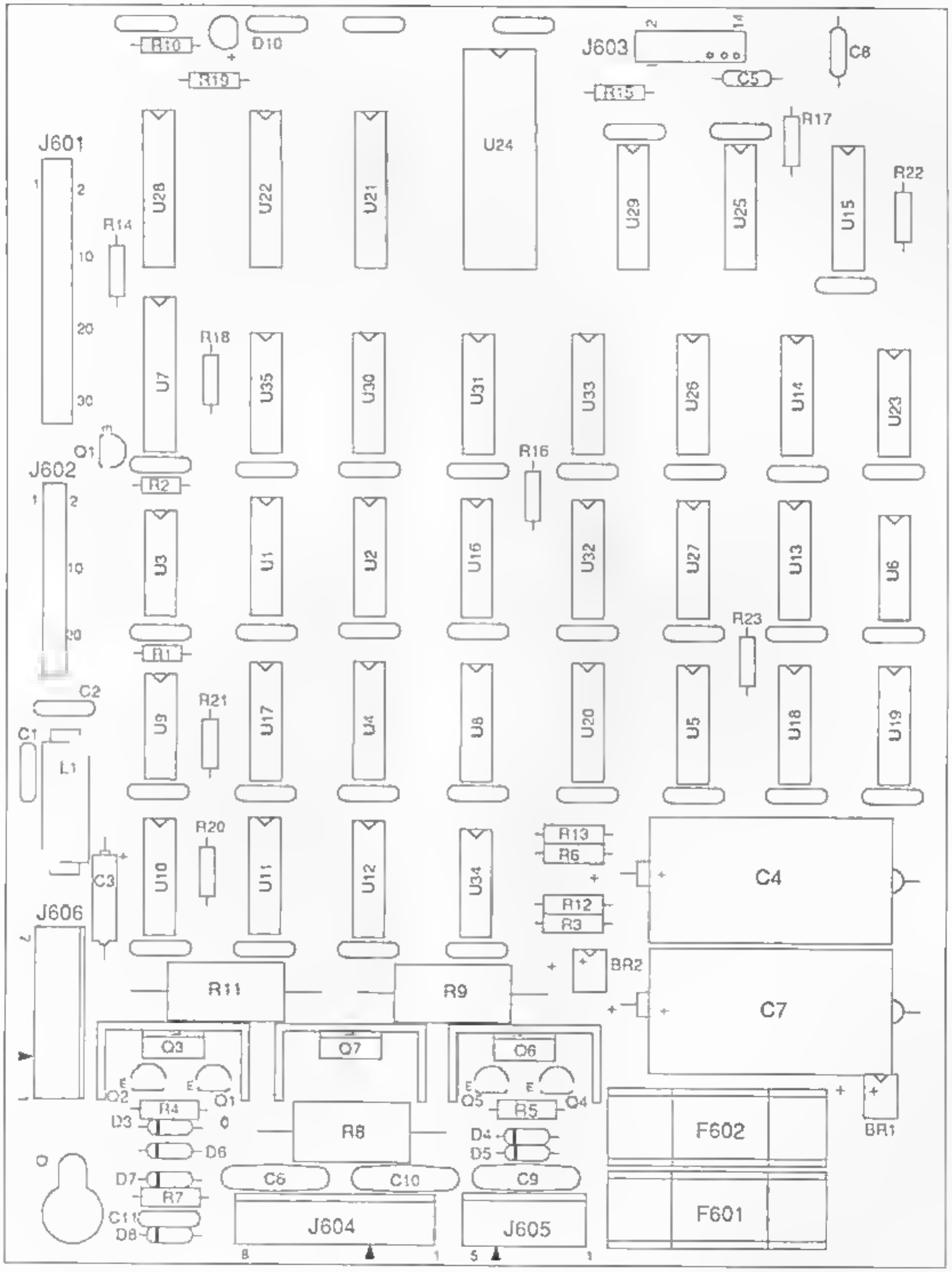
Item	Part Number	Ckt Designator	Description
1	Not Used		
2	4006-01005-06	Q1, Q2	Mach, Screw, 6-32 x 3/8
3	4406-01128-00	Q1, Q2	Nut, 6-32 KEPS
4	4004-01005-06	Q10, Q12, Q14, Q16, Q18	Mach, Screw, 4-40 x 3/8
5	4404-01119-00	Q10, Q12, Q14, Q16, Q18	Nut, 4-40 SNUT
6	5010-08981-00	R260	Resistor, 10KΩ, 1/2w, 5%
7	5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R33, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R100, R132, R134, R136, R138, R140, R209, R227	Resistor, 4.7KΩ, 14w, 5%
8	5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Resistor, 560Ω, 1/4w, 5%
9	5010-08993-00	R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R63, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124	Resistor, 68Ω, 1/4w, 5%
10	5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123, R195	Resistor, 2.7KΩ, 1/4w, 5%
11	5010-08998-00	R155, R157, R159, R181, R165, R167, R169, R171	Resistor, 2.2KΩ, 1/4w, 5%
12	5010-09034-00	R3, R4, R6, R142-R149, R197-R198	Resistor, 10KΩ, 1/4w, 5%
13	5010-09085-00	R194, R196, R251, R253-R257	Resistor, 1.5KΩ, 1/4w, 5%
14	5010-09086-00	R252	Resistor, 6.8KΩ, 1/4w, 5%
15	5010-09224-00	R1, R2, R192, R201- R205, R208	Ressistor, 270Ω, 1/4w, 5%
16	5010-00314-00	R178, R178, R180, R182 R184, R186, R188, R190	Resistor, 1.2KΩ, 1/4w, 5%
17	5010-09324-00	R206	Resistor, 27KΩ, 1/4w, 5%
18	5010-09358-00	R154, R156, R158, R160, R164, R166, R168, R170, R162, R193, R199, R200 R250	Resistor, 1KΩ, 1/4w, 5%
19	5010-09361-00	R104, R107, R110, R113 R116, R119, R122, R125	Resistor, 220Ω, 1/4w, 5%
20	5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Resistor, 470Ω, 1/4w, 5%
21	5010-09534-00	W1, W2	Resistor, 0Ω
22	5010-11079-00	R7, R10, R13, R16, R19	Resistor, 51Ω, 1/4w, 5%
23	5010-12427-00	R150-R153, R172-R175	Resistor, .22Ω, 1w, 5%
24	5012-12632-00	R224	Resistor, .12Ω, 10w, 5%
25	5012-12238-00	R210, R211	Resistor, 3.3KΩ, 5w, 10%
26	5019-10143-00	SR1	SIP, 9R, 10 pin, 470Ω, 5%
27	5040-08988-00	C4	Capacitor, 100μfd, 10v (±20%)
28	5040-09421-00	C2	Capacitor, 100μfd, 25v (+50, -10%)
29	5040-09537-00	C8	Capacitor, 100μfd, 100v (±20%)
30	5040-12313-00	C5, C6, C7, C11, C30	Capacitor, 15,000μfd, 25v (±20%)
31	5043-08980-00	B-BYPASS	Capacitor, .01μfd, 50v (+80, -20%)
32	5043-08996-00	C13-C20, C31	Capacitor, .1μfd, 50v (±20%)
33	5043-09845-00	C1, C12	Capacitor, 1,000pfd, 50v (±20%)
34	5048-10994-00	C3	Capacitor, .33μfd, 50v (±20%) Ax.
35	5070-08919-00	D33, D34	Diode, 1N4148, 150MA.
36	5070-09054-00	D1-D3, D5-D12, D17-D32, D38, D39	Diode, 1N4004, 1.0A.
37	5100-09690-00	BR1-BR5	Bridge Rectifier, 35A., 200v
38	5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac, BT138E
39	5162-12422-00	U19	IC, ULN 2803
40	5162-12635-00	Q20, Q22, Q24, Q26, Q28 Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83 - Q90	Transistor, TIP 102
41	5194-09055-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74, Q99	Transistor, 2N5401 PNP
42	5191-12179-00	Q64, Q66, Q68, Q70, Q76 Q78, Q80, Q82	Transistor, TIP36C PNP
43	5192-12428-00	Q91-Q98	Transistor, TIP 107
44	5250-12634-00	Q1	Reg LM 323 5v
45	5281-09486-00	U1-U5, U18	IC, 74LS374 8 Dual D Flipflop
46	5281-09487-00	U10-U13	IC, 74LS74 Dual D flipflop
47	5281-10182-00	U9	IC, 74LS240, L/Drvr
48	5370-12272-00	U6, U15, U18	IC, LM339 Quad. Comp
49	5460-12423-00	Q2	IC, LM 7812
50	5490-10892-00	U7, U8	Opto Isolator, 4N25
51	5580-08994-01	RLY 1	Relay 4PDT 6VDC5A VS
52	5671-09019-00	LED1 - LED7	Display LED Red
53	5701-09652-00	Q1	Thermal Pad TO-3
54	5705-09199-00	Q2	Heatsink, #6030B
55	Not Used		
56	5705-12637-00	Q1	Heatsink 5054
57	5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
58	5733-12060-01		Fuse Holder, F101-F116
59	Not Used		
60	5791-10862-00	J108, J119, J136	Connector, 3-pin Header STR Sq.
61	5791-10862-04	J103, J116-J118	Connector, 4-pin Header STR Sq.
62	5791-10862-05	J112, J104-J106, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header STR Sq.
63	5791-10862-06	J107	Connector, 6-pin Header STR Sq.
64	5791-10862-07	J101, J109, J114	Connector, 7-pin Header STR Sq.
65	5791-10862-09	J102, J110, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header STR Sq.
66	5791-10862-11	J120, J121	Connector, 11-pin Header STR Sq.
67	5791-10862-12	J115	Connector, 12-pin Header STR Sq.
68	5791-10862-13	J126	Connector, 13-pin Header STR Sq.
69	5791-12461-05	J111	Connector, 5-pin Header STR Sq.
70	5791-12461-09	J133-J135	Connector, 9-pin Header STR Sq.
71	5791-12516-00	J113	34 HEN 2x17 STR
72	5824-09248-00	TP1-TP8	Test Point #1502-1
73	5041-09163-00	C9	Capacitor, 2.2μfd TANT
74-100	Not Used		
101	Not Used		
102	5730-09071-00	F114	Fuse, 8A, 32v
103	Not Used		
104	5731-09432-00	F112	Fuse, S-B, 7A., 250v
105	5731-09651-00	F106 - F111, F113	Fuse, S-B, 5A., 250v
106	Not Used		
107	5731-10356-00	F101 - F105, F116	Fuse, S-B, 3A., 250v
108	5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
109	5705-12698-00		Heatsink #62365
110	4010-01006-00		Mach. Screw, 10-32 x 5/8

A-12697-1 WPC Power Driver Assembly

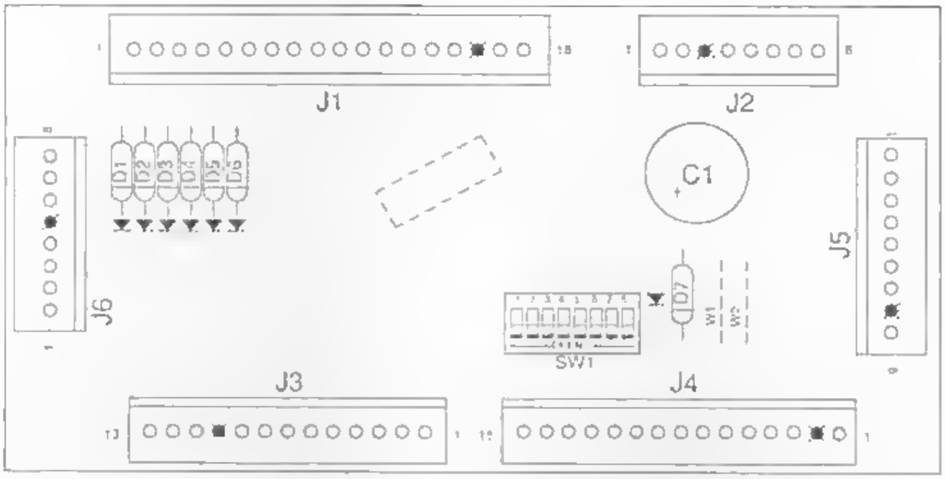

J103
J102
J101
J104
J105
F111
F112
F113
F114
C8
C7
U19
U18
U13
U12
U16
U11
U15
U9
U10
J137
J138
J136
J133
J134
J135
BR2
HEAT SINK ASSY A-13944
BR1
C11
C5
J132
J131
J130
BR4
Q1
U5
BR3
R224
J129
J127
J128
J106
J107
F105
F104
F103
F102
F101
U4
U3
U2
U1
J108
J125
J126
R211
J109
R210
Q2
C2
J124
J123
J122
J110
RLY1
J120
J121
F115
U6
J111
F109
F110
J112
F116
BR5
C30
J113
J114
J115
F108
F107
F106
J119
J118
J117
J116

A-14039 Dot Matrix Controller Assembly

Part Number	Ckt Designator	Description
5010-08991-00	R1	Resistor, 4.7KΩ, 1/4w, 5%
5010-09224-00	R10	Resistor, 270Ω, 1/4w, 5%
5010-12832-00	R3, R6, R12, R13	Resistor, 47KΩ, 1/2w, 5%
5010-12841-00	R4, R5	Resistor, 120Ω, 1/2w, 5%
5012-12830-00	R9	Resistor, 1.8KΩ, 5w, 5%
5012-12842-00	R11	Resistor, 120Ω, 5w, 5%
5012-12843-00	R8	Resistor, 4.7K, 5w, 5%
5010-10171-00	R7	Resistor, 56Ω, 1/4w, 5%
5040-08986-00	C3	Capacitor, 100µfd., 10v, (±20%)
5040-12324-00	C4, C7	Capacitor, 150µfd., 160v, (±50%)
5043-08980-00	BYPASS	Capacitor, .01µfd., 50v, (+80, -20%)
5043-09072-00	C6, C9, C10	Capacitor, .1µfd., 500v, (+80, -20%)
5043-09845-00	C1, C2, C11	Capacitor, 1KP, 50v, (±20%)
5043-09492-00	C5, C8	Capacitor, 100P, 50v, (±10%)
5070-09054-00	D7	Diode, 1N4004, 1.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v
5075-12823-00	D4, D5	Zener, 1N4758A, 62v
5075-12826-00	D3	Zener, 1N4759A, 62v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A.
5160-10269-00	Q1	Transistor, 2N3904 NPN
5164-09056-00	Q2, Q10	Transistor, MPSD02, NPN
5164-12154-00	Q3, Q7	Transistor, MJE15030 NPN
5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5194-12155-00	Q6	Transistor, MJE15031 PNP
5281-09738-00	U16, U25 - U27	IC, 74LS157
5281-10033-00	U3	IC, 74LS30
5281-10043-00	U31 - U33, U35	IC, 74LS175
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5311-10947-00	U9	IC, 74HC125
5311-10951-00	U10, U11	IC, 74HC161
5311-10977-00	U6	IC, 74HC04
5311-12817-00	U29	IC, 74HC165
5311-12819-00	U21	IC, 74HC688
5311-12820-00	U23	IC, 74HC27
5311-12822-00	U13 - U15	IC, 74HC193
5315-12009-00	U22	IC, 74HCT374
5315-12812-00	U1, U2, U30	IC, 74HCT138
5281-09308-00	U28	IC, 74HCT245
5315-12815-00	U8, U34	IC, 74HCT08
5315-12816-00	U19	IC, 74HCT32
5315-12821-00	U7	IC, 74HCT240
5340-12278-00	U24	S/RAM 2064 150NS
5551-09822-00	L1	IND 4.7µH, 3.0A.
5671-09019-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink 5030B
5731-12328-00	F601, F602	Fuse, 3/8A ,SB, 250v
5733-12060-00		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin STR Sq.
5791-10862-05	J605	Connector, 5-pin Header Sq.
5791-10862-07	J606	Connector, 7-pin Header Sq.
5791-10862-08	J604	Connector, 8-pin Header Sq.
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR
5010-09036-00	R14-R23	Resistor, 100Ω, 1/4w, 5%
4006-01003-06	Q3, Q6, Q7	Mach Screw, 6-32 x 3/8
4406-01128-00	Q3, Q6, Q7	Nut, 6-32 KEPS


R10
D10
R19
J603
C8
R15
C5
R17
U24
J601
U28
U22
U21
U29
U25
U15
R22
R14
U7
R18
U35
U30
U31
U33
U26
U14
U23
Q1
R16
J602
R2
U3
U1
U2
U16
U32
U27
U13
U6
R23
R1
C2
U9
R21
U17
U4
U8
U20
U5
U18
U19
C1
L1
R20
U10
U11
U12
U34
R13
R6
C4
C3
R12
R3
J606
BR2
R11
R9
C7
Q3
Q7
Q6
Q2
Q1
Q5
Q4
R4
R5
D3
R8
F602
BR1
D4
D5
D6
D7
C6
C10
C9
R7
C11
D8
J604
J605
F601

A-14689 WPC Coin Door Interface Board

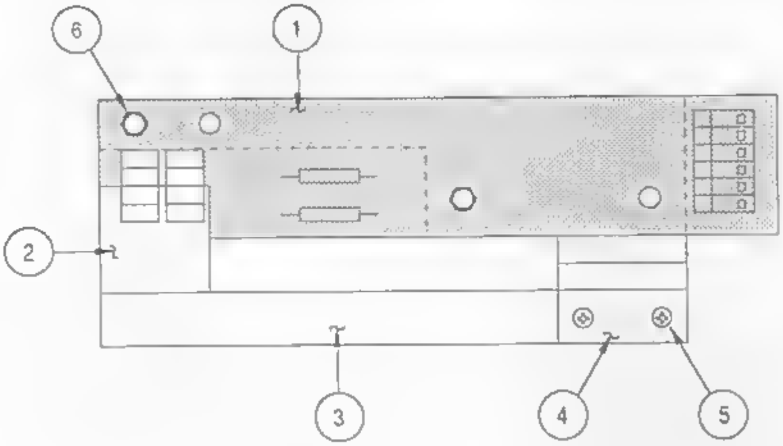


Part Number	Designator	Description
5070-09054-00	D1-D7	Diode, 1N4004, 1.0A.
5791-10862-18	J1	Connector, 18-pin Header Str Sq.
5791-10862-08	J2, J6	Connector, 8-pin Header Str Sq.
5791-10862-13	J3	Connector, 13-pin Header Str Sq.
* 5791-10862-15	J4	Connector, 15-pin Header Str Sq.
* 5791-10862-09	J5	Connector, 9-pin Header Str Sq.
* 5645-09025-00	SW1	Switch DIP 8-Position

Notes:

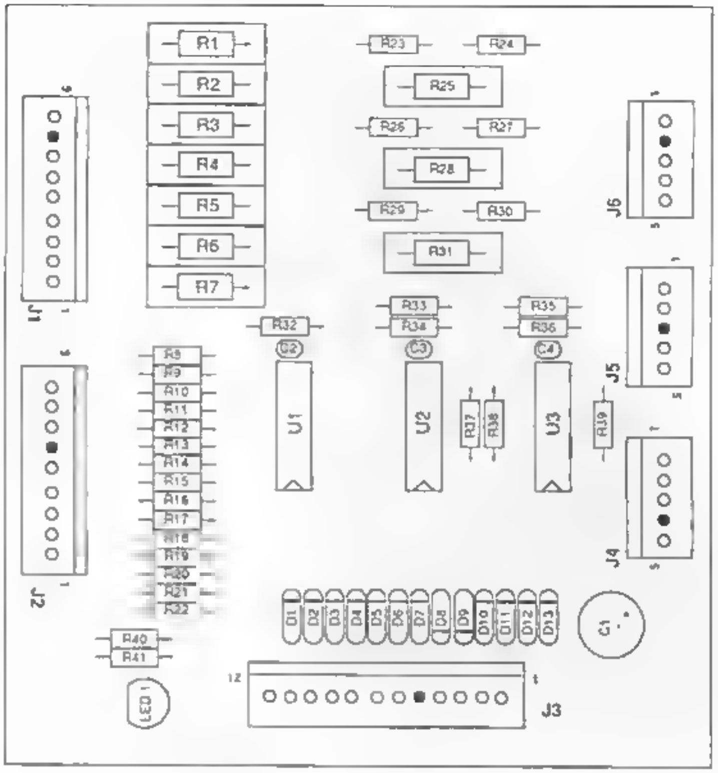
1. For Belgium, France, Finland, Sweden and England use A-14689-1 Coin Door Interface Board.
2. * = Used on Electronic Coin Door only

A-15878 Double Flipper Opto Assembly



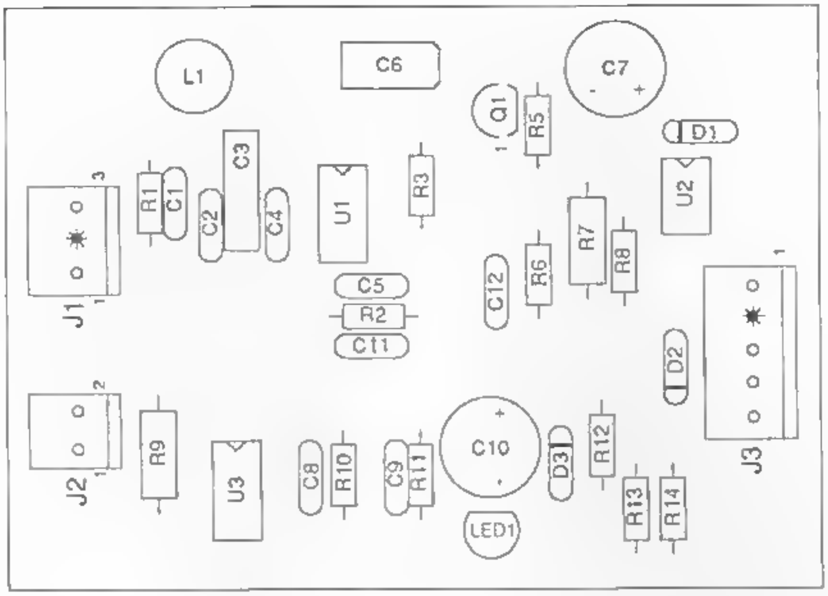
Item	Part Number	Description
1.	A-15894	PC Board Assembly
	5010-08930-00	Resistor 470Ω, 1/2w, 5%
	5490-12451-00	Opto Inter Lg. 10ma.
	5791-12273-07	Connector, 7-pin Header
2.	01-11250	Interrupter Opto
3.	06-86	Back Up Blade (2)
4.	A-15893	Opto Board Mtg. Bracket
5.	4006-01003-04	MS 6-32 x 1/4 P-PH (2)
6.	4406-01119-00	Nut #6 ESN (2)

A-15430 10-Switch Opto Assembly


R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
C1
C2
C3
C4
U1
U2
U3
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
LED1
J1
J2
J3
J4
J5
J6
12
1

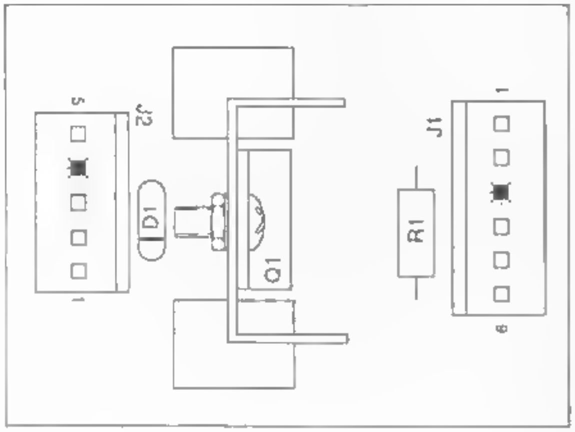
Part Number	Designator	Description
5040-10974-00	C1	Capacitor, 100µfd, 35v (+80, -20%)
5043-08980-00	C2 - C4	Capacitor, 0.01µfd, 50v (+1, -20%)
5671-09019-00	LED1	Display LED 1 Red
5370-12272-00	U1 - U3	IC LM339 Quad
5070-09054-00	D1 - D13	Diode 1N4004 1.0A.
5010-12928-00	R1- R7, R25, R28, R31	Resistor, 270Ω, 2w, 5%
5010-09999-00	R8 - R21, R23, R24, R26 R27, R29, R30	Resistor, 2KΩ, 1/4w, 5%
5010-09314-00	R22	Resistor, 1.2KΩ, 1/4w, 5%
5010-09162-00	R32, R35, R39, R40, R41	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R33, R34, R36	Resistor, 22KΩ, 1/4w, 5%
5010-09034-00	R37, R38	Resistor, 10KΩ, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header STR Sq. Pin .156
5791-10862-09	J1, J2	Connector, 9-pin Header STR Sq. Pin .156
5791-10862-05	J4 - J6	Connector, 5-pin Header STR Sq. Pin .156

A-15646 24-Switch Opto Assembly



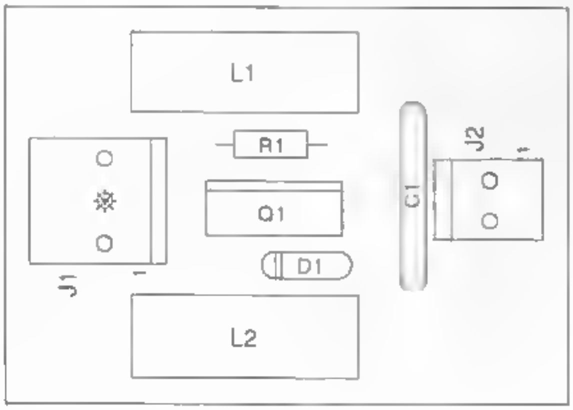
Part Number	Designator	Description
5370-10891-00	U1	I.C. Opto Receiver MC3373
5490-10892-00	U2	I.C. Opto Isolator
5431-10449-00	U3	I.C. 555 Timer
5192-13267-00	Q1	Transistor, MPSA77 PNP
5043-10893-00	C3	Capacitor, .0015µfd
5043-09065-00	C4, C12	Capacitor, 470µpf
5043-08996-00	C5, C11	Capacitor, .1µfd
5041-10588-00	C6	Capacitor, 6.8µfd
5043-08980-00	C8	Capacitor, .01µfd
5048-12577-00	C2	Capacitor, .47µfd
5043-09845-00	C1, C9	Capacitor, .001µfd
5070-09054-00	D1 - D3	Diode 1N4004, 1.0A.
5040-10974-00	C7, C10	Capacitor, 100µfd, 35v (+80, -20%)
5010-10631-00	R1	Resistor, 1.2KΩ, 1/4w, 5%
5010-09162-00	R2, R6	Resistor, 100KΩ, 1/4w, 5%
5010-09768-00	R3	Resistor, 180Ω, 1/4w, 5%
5010-09039-00	R4, R12	Resistor, 10Ω, 1/4w, 5%
5010-09324-00	R5	Resistor, 27KΩ, 1/4w, 5%
5010-08930-00	R7	Resistor, 470Ω, 1/4w, 5%
5010-13509-00	R9	Resistor, 330Ω, 1/2w, 5%
5010-09034-00	R8	Resistor, 10KΩ, 1/4w, 5%
5010-10022-00	R10	Resistor, 7.5KΩ, 1/4w, 5%
5010-08773-00	R11	Resistor, 18KΩ, 1/4w, 5%
5010-09085-00	R13	Resistor, 1.5KΩ, 1/4w, 5%
5671-09019-00	LED1	Display LED Red
5791-12273-03	J1	Connector, 3-pin Header STR SQ.
5791-12273-02	J2	Connector, 2-pin Header STR SQ.
5791-12273-05	J3	Connector, 5-pin Header STR SQ.
5551-10890-00	L1	Inductor 10µH

A-16697-1 High Current Driver Assembly



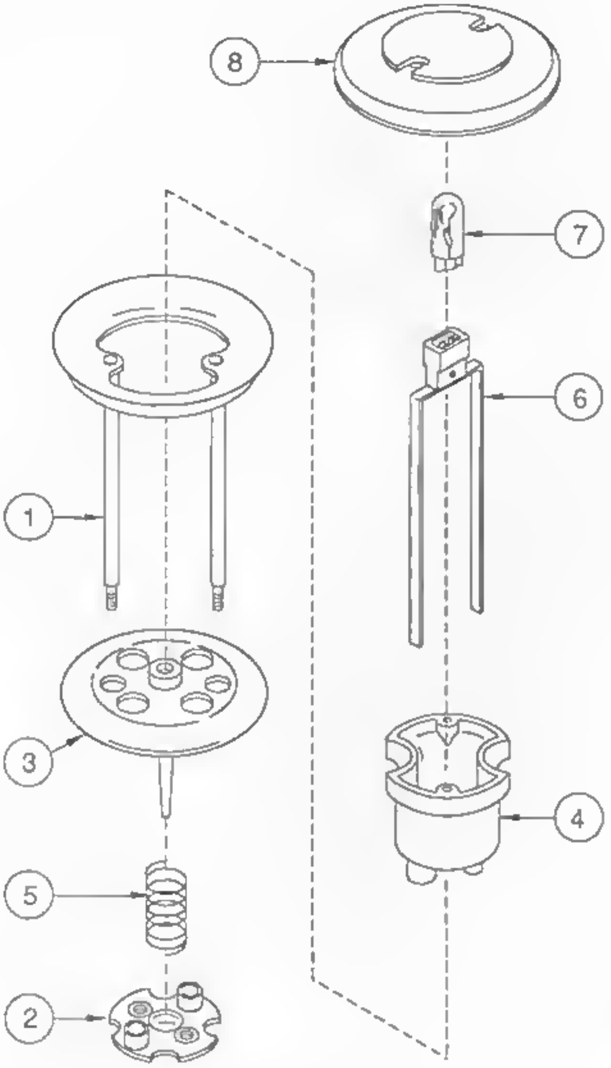
Part Number	Designator	Description
4406-01119-00	-	Nut 4-40 KEPS
4006-01003-06	-	Mach. Screw, 6-32 x 3/8 P-PH-S
4004-01005-06	-	Mach. Screw, 4-40 x 3/8 P-PH-S
5705-12805-00	-	Heatsink
5010-09361-00	R1	Resistor, 220Ω, 1/2w, 5%
5070-09054-00	D1	Diode, 1N4004, 1.0A.
5191-12179-00	Q1	Transistor, TIP36C PNP
5791-10862-05	J2	Connector, 5-pin STR Sq. .156
5791-10862-06	J1	Connector, 6-pin STR Sq. .156

A-15542 Motor EMI Board



Part Number	Designator	Description
5551-09822-00	L1, L2	Ind. 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Sq.
5791-12273-02	J2	Connector, 2-pin Header Sq.
5070-09054-00	D1	Diode 1N4004, 1.0A.

B-9414-3
Jet Bumper Assembly

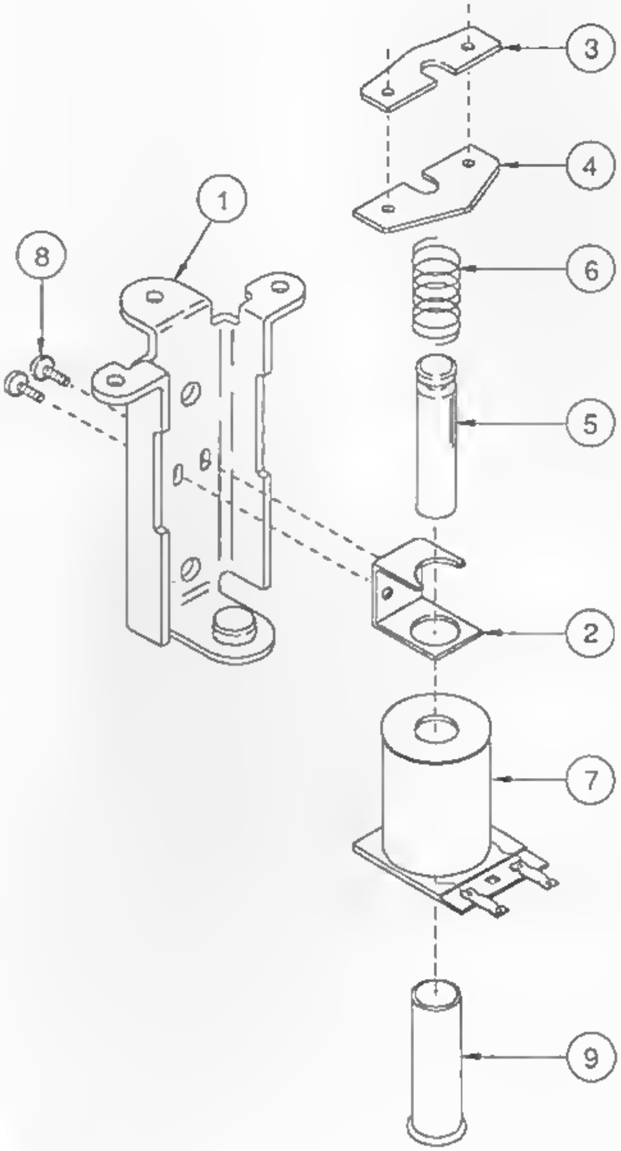


Item	Part Number	Description
1.	A-4754	Bumper Ring Assembly
2.	03-6009-A5	Bumper Base, White
3.	03-6035-4	Bumper Wafer, Red
4.	03-7443-5	Bumper Body, White
5.	10-7	Spring
6.	24-8776	Socket - Wedge Base
7.	24-8768	Bulb #555 (6.3V., 0.25A.)

Associated Parts:

8.	03-8254-9	Jet Bumper Cap, Transparent Red (3 Used)

A-9415-2
Jet Bumper Coil Assembly



Item	Part Number	Description
1.	B-7417	Bracket & Stop Assembly
2.	01-1747	Coil Retaining Bracket
3.	01-5492	Armature Link, Steel
4.	01-5493	Armature Link, Bakelite
5.	02-3406-1	Coil Plunger
6.	10-326	Armature Spring
7.	AE-26-1200	Coil Assembly
8.	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9.	03-7066	Coil Tubing

A-15205-R-4 Fliptronic II Flipper Assembly (Lower Right)
A-15205-L-4 Fliptronic II Flipper Assembly (Lower Left)

Item	Part Number	Description
1.	B-13104-R	Flipper Base Assy, Right
*	B-13104-L	Flipper Base Assy, Left
2.	SW-1A-193	Switch Assembly
3.	4701-00002-00	Lockwasher, #6 Split
4.	4105-01019-10	Sh. Metal Screw, #5 x 5/8 P-RH-A
5.	4008-01079-05	Mach. Screw, 8-32 x 5/16 H-SOC
6.	4701-00003-00	Lockwasher, #8 Split
7.	01-9375	Switch Mounting Bracket
8.	20-6516	Speednut, Tinnerman
9.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
10.	4701-00004-00	Lockwasher, #10 Split
11.	A-12111	Flipper Stop Assembly
12.	FL-15411	Flipper Coil (Orange)
a)	03-7066-5	Coil Tubing
13.	01-7695	Solenoid Bracket
14.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S
15.	10-364	Spring
16.	B-13882-R	Crank Link Assembly, Right
*	B-13882-L	Crank Link Assembly, Left
a)	B-13884-R	Flipper Crank Assembly, Right
*	B-13884-L	Flipper Crank Assembly, Left
b)	A-10656	Flipper Link Assembly
c)	02-4179	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8 SH
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
17.	23-6577	Bumper Plug, 5/8"
18.	03-7568	Flipper Bushing
19.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH
20.	4406-01117-00	Nut, 6-32 Hex.

Associated Parts for Left & Right Flippers:

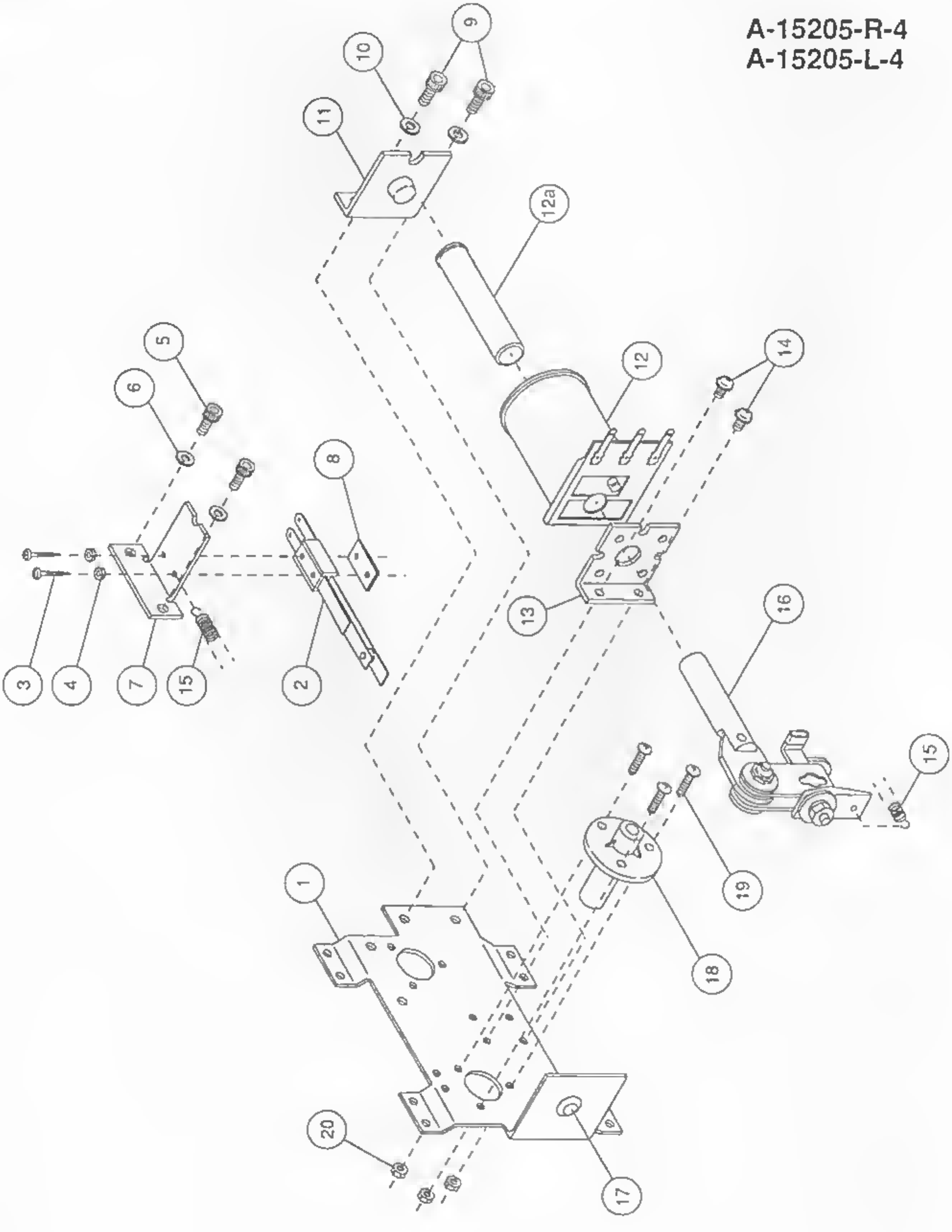
21.	23-6678-7	Flipper Rubber (Black)
22.	20-9250-4	Flipper & Shaft (Red)

Flipper Notes:

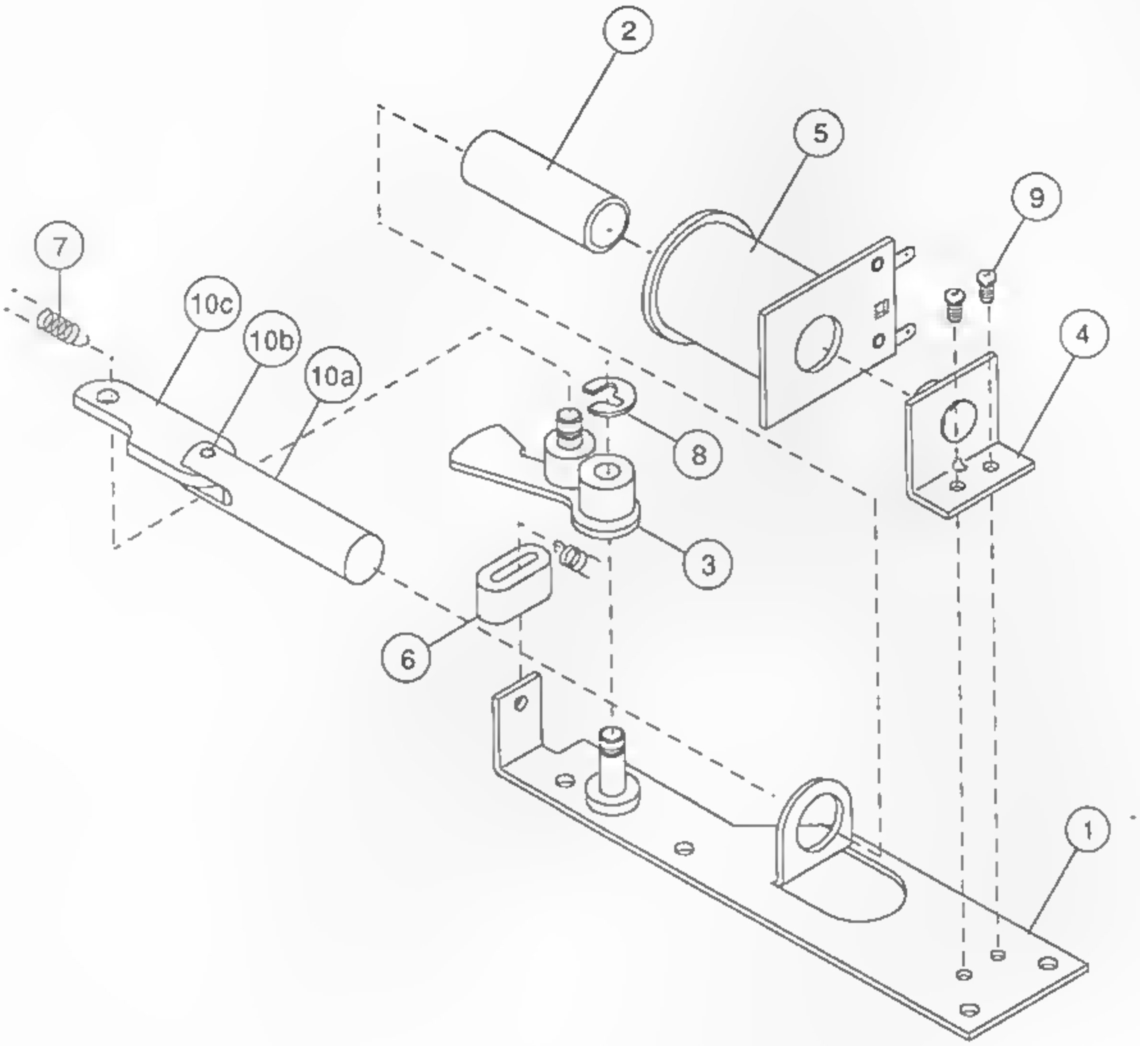
1. *** Items for Left Flipper Assembly ONLY.**
2. Each Flipper Assembly is mounted beneath the playfield, in conjuction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
3. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (±.015) inch. When flipper is activated switch must close.
4. Any adjustment of the E.O.S. Switch must be made at a minimum distance of 0.25 inch from the switch body.
5. Longer blade of E.O.S. Switch must be straight. Gap adjustment is done by adjusting shorter blade.
6. All moving elements of the assembly must operate freely without any evidence of binding.
7. Apply Loctite™ 242 when reataching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.

Fliptronic II Flipper Assembly

A-15205-R-4
A-15205-L-4

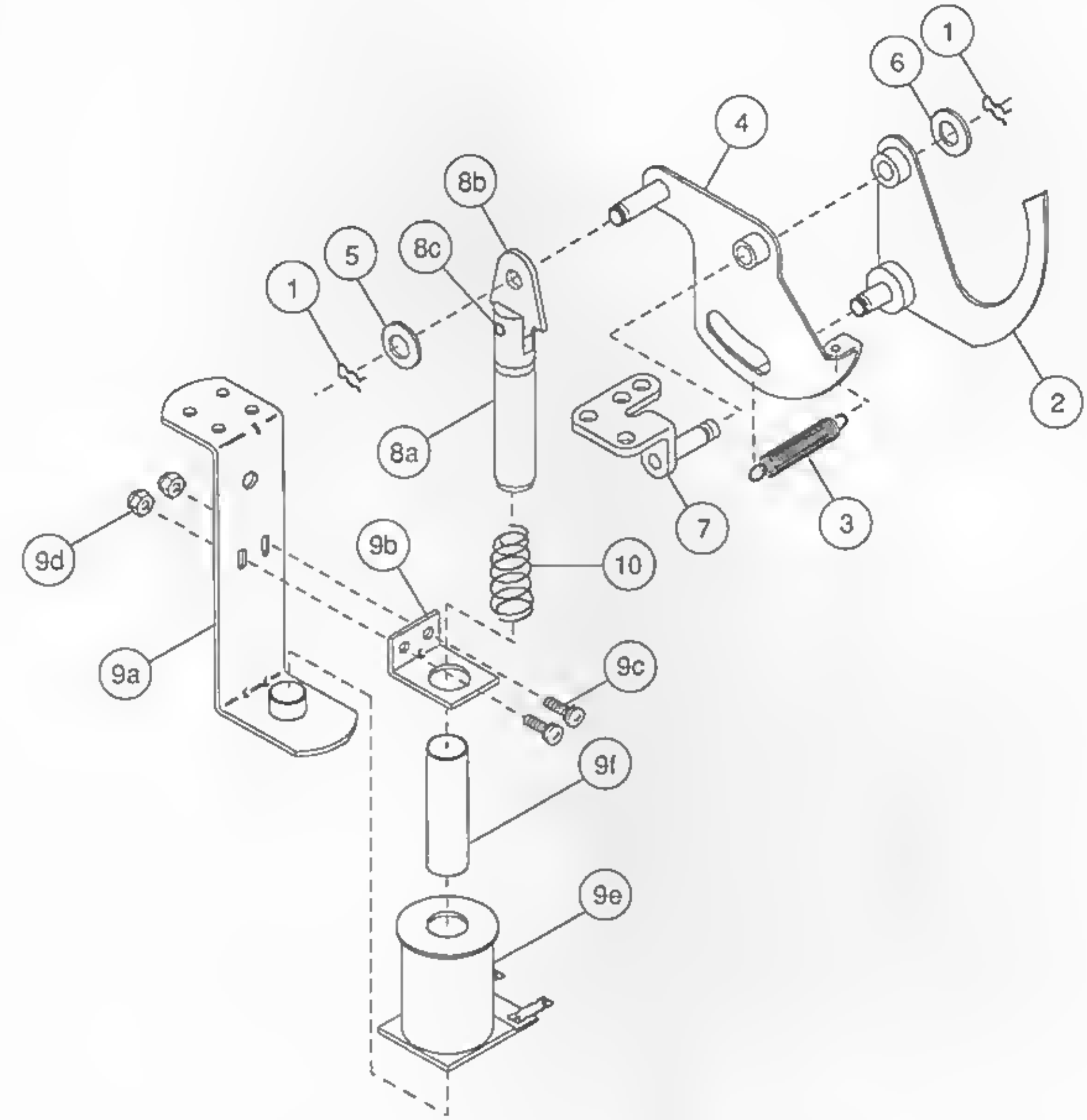

9
10
11
12a
5
6
8
12
14
13
16
3
4
7
15
2
15
19
1
18
20
17

A-8039-3 Outhole Kicker Assembly



Item	Part Number	Description
1.	A-6378	Mounting Plate Assembly
2.	03-7066	Coil Tubing
3.	A-6889	Kicker Lever Assembly
4.	A-8038	Coil Stop Assembly
5.	AE-27-1200	Coil Assembly
6.	03-7176-1	Striker Ring
7.	10-101-4	Spring-Reset
8.	20-8712-25	"E" Ring, 1/4" Shaft
9.	4006-01003-03	Mach. Screw, 6-32 x 3/16"
10.	A-8335	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	20-8716-5	Roll Pin, 1/8 x 7/16"
c)	01-4251	Ball Return Link

C-9638 Ball Shooter Lane Feeder Assembly

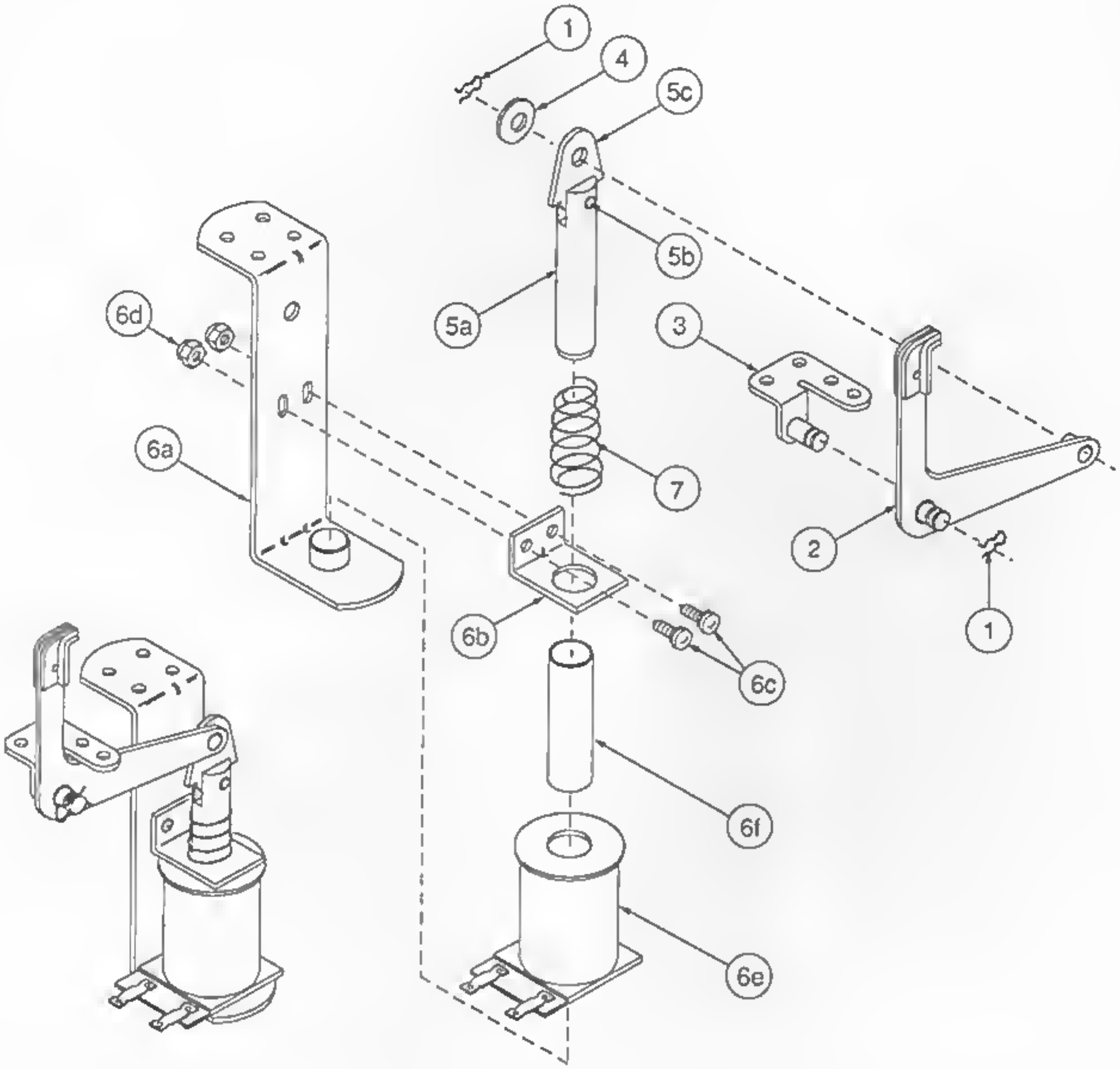


Item	Part Number	Description
1.	12-6227	Hairpin Clip
2.	A-8247	Eject Cam Assembly
3.	10-362	Ejector Spring (Plain)
4.	A-6949-L	Spring Plate Assembly
5.	4700-00030-00	Flatwasher, 17/64 x1/2 x 15ga.
6.	4700-00103-00	Flatwasher, 17/64 x1/2 x 28ga.
7.	A-8268	Mounting Bracket Assembly
8.	A-8050-1	Coil Plunger Assembly
a)	02-3407-2	Coil Plunger Assy. 2-1/8"
b)	03-8085	Armature Link
c)	20-8716-5	Roll Pin, 1/8 x 7/16"

Associated Parts:

Item	Part Number	Description
9.	**B-9362-R-3**	Coil & Bracket Assembly
a)	B-7572-1	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
10.	10-128	Spring

B-12665 Kicker Arm (Slingshot) Assembly

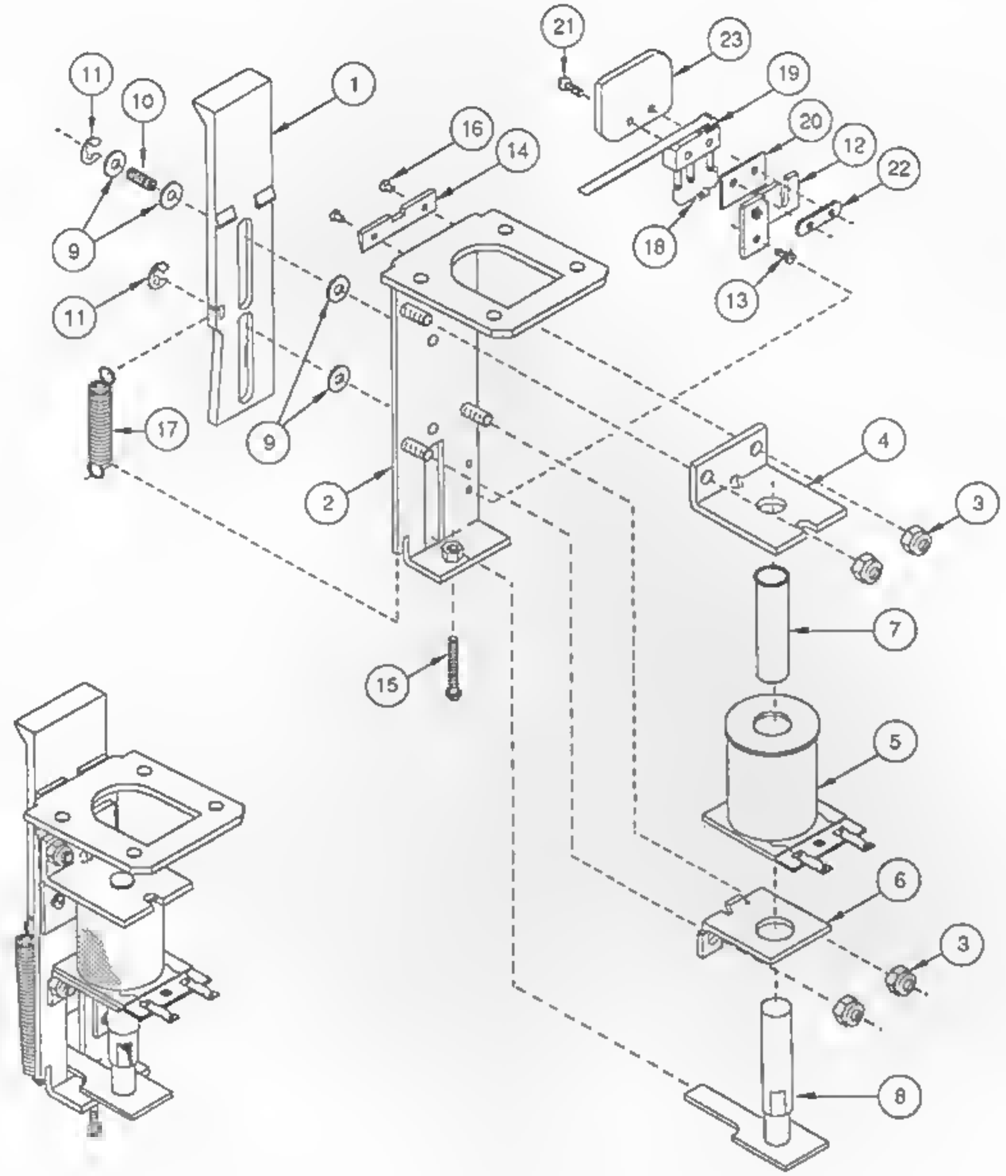


Item	Part Number	Description
1.	12-6227	Hairpin Clip
2.	A-12664	Kicker Crank Assembly
3.	A-5653	Mounting Bracket Assembly
4.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
5.	A-5103	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	03-8085	Armature Link
c)	20-8716-5	Roll Pin, 1/8 x 7/16"

Associated Parts for **Right & Left Kickers:**

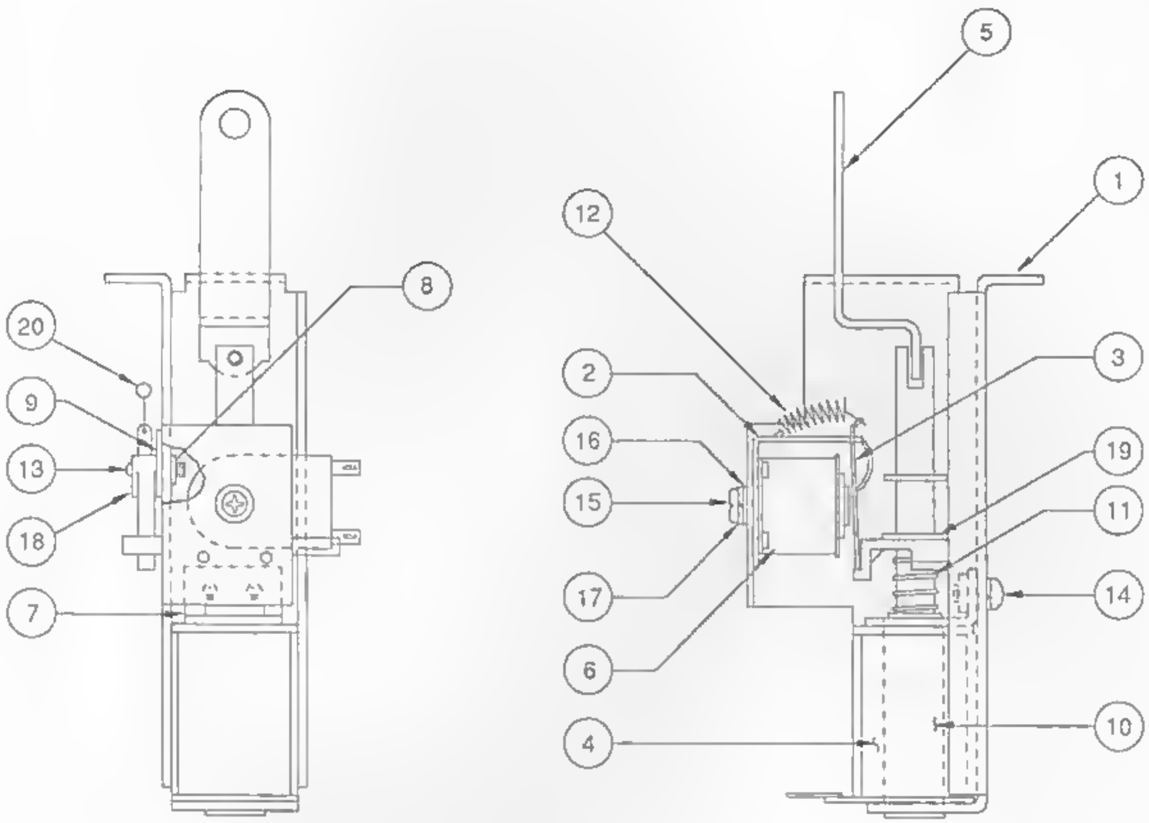
Item	Part Number	Description
6.	**B-9362-R-3**	**Coil & Bracket Assy., Right**
	B-9362-L-2	**Coil & Bracket Assy., Left**
a)	B-7572-1	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
7.	10-128	Spring

A-16267 1-Bank Drop Target Assembly



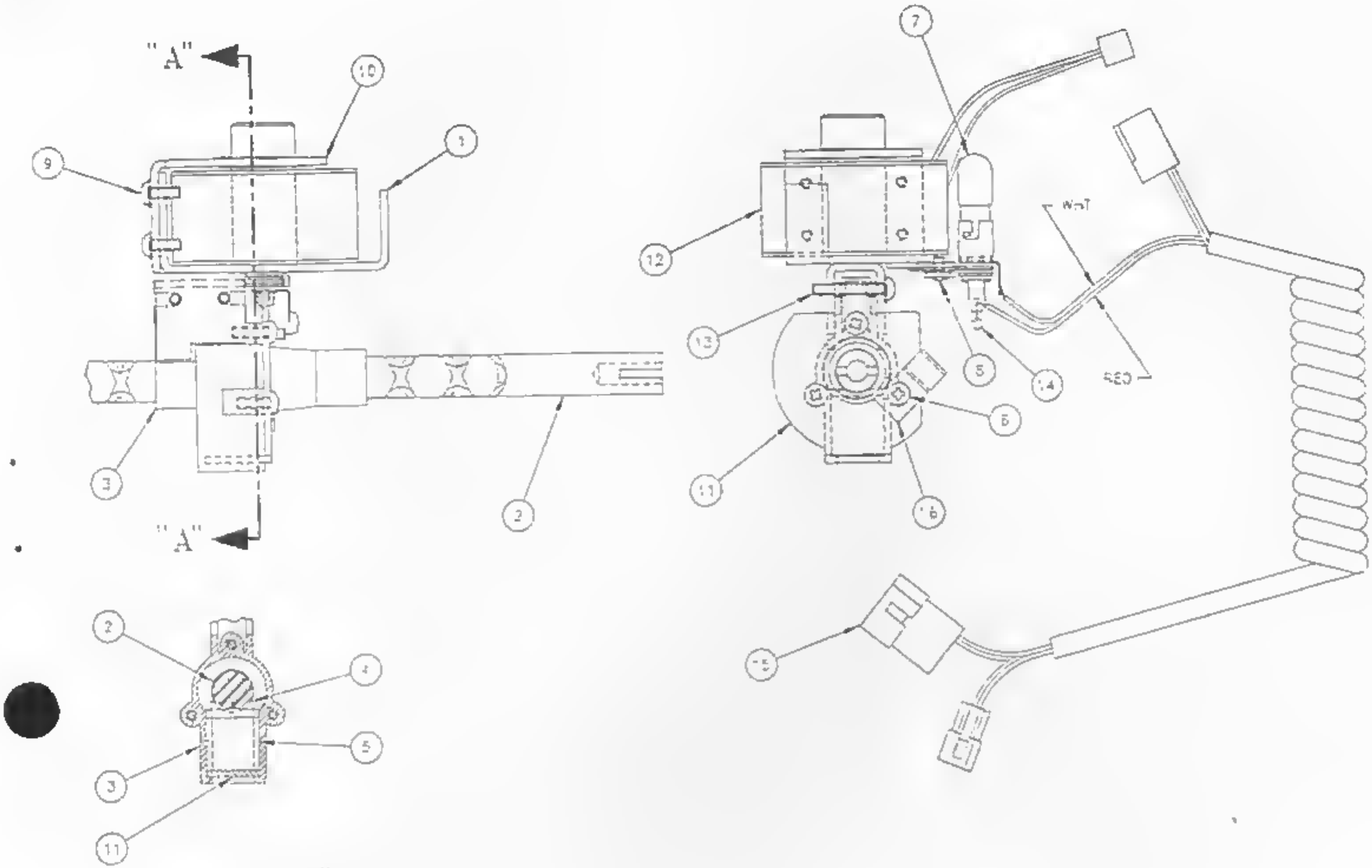
Item	Part Number	Description
1.	03-8033	Target - Flush
2.	A-14617	Bracket & Post Assembly
3.	4408-01119-00	Nut 8-32 ESNA
4.	A-11397	Stop Bracket Assembly
5.	AE-26-1200	Coil Assembly
6.	01-8413	Coil Mounting Bracket
7.	03-7066-4	Tubing
8.	A-11388-2	Plate & Reset Plate Assembly
9.	4700-00072-00	Flatwasher
10.	10-392	Spring
11.	20-8712-25	"E" Ring
12.	01-10183	Switch Bracket
13.	4006-010003-03	Mach. Screw, 6-32 x 3/16 P-PH
14.	03-8034	Stop Single Target
15.	4010-01025-14	Mach. Screw, 10-32 x 7/8 P-RH
16.	07-6688-17N	Rivet, 5/32 x 7/32"
17.	10-433	Extension Spring
18.	5070-09054-00	Diode 1N4001
19.	5647-12693-31	Switch
20.	01-8600	Switch Insulator
21.	4002-01105-10	Mach. Screw, 2-56 x 5/8 P-PH-S
22.	01-8240	Nut Plate
23.	03-8630	Actuator Guide

A-16264 Lift Ramp Assembly



Item	Part Number	Description
1.	A-16043	Bracket Lift Sub-Assembly
2.	A-6892	Frame & Eyelet
3.	A-15821	Armature Sub-Assembly
4.	AE-26-1200	Coil Assembly
5.	A-16248	Post Lift Ramp Lift Sub-Assembly
6.	SM1-28-900DC	Coil Assembly
7.	01-9794	Coil Retainer Bracket
8.	01-8240	Nut Plate
9.	01-8600	Insulator
10.	03-7066	Tubing
11.	10-437	Kicker Spring
12.	10-96	Spring
13.	4002-01105-08	Mach. Screw, 2-56 x 1/2 P-PH
14.	4008-01017-05	Mach. Screw, 8-32 x 5/16 P-RH-S
15.	4008-01021-07	Mach. Screw, 8-32 x 7/16 PRH-BR
16.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
17.	4701-00003-00	Lockwasher #8 Split
18.	5647-12693-36	Mini-Switch
19.	20-8712-43	"E"-Ring
20.	5070-09054-00	Diode 1N4004
21.	H-16437	Cable Assembly

A-16266 Coil Magnet & Screw Assembly



SECTION "A–A"

Item	Part Number	Description
1.	A-16136	Mounting Magnet Sub-Assy.
2.	02-4707	Reversing Screw
3.	03-8771	Carrier Body
4.	02-4343	Follower-Rev. Screw
5.	20-9567	Bushing, Bronze
6.	4106-01001-07	Sh. Metal Screw, #6x7/16 P-PH-A
7.	A-16205	Light Socket & Bulb Assembly
8.	4006-01003-03	Mach. Screw, #6-32 x 3/16"
9.	4008-01003-06	Mach. Screw, #8-32 x 3/8 P-PH-S
10.	A-16308	Bracket & Eyelet Assembly
11.	03-8842	Carrier Cap
12.	20-9831	Coil Magnet Assembly
13.	4006-01003-14	Mach. Screw, #6-32 x 7/8 P-PH-S
14.	5070-09054-00	Diode 1N4004 1.0A.
15.	A-16311	Cable Assembly
16.	03-7655-4	Cable Clamp, 1/4"

A-16261
Coffin Ball Popper Assembly

Item	Part Number	Description
1.	A-16140	Ball Popper Sub-Assy.
2.	AE-24-900	Coil Assembly
3.	03-7067	Tubing Coil
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	01-10895	Coil Bracket
7.	A-13270	Bell Armature Assembly
8.	4408-01119-01	Nut 8-32 ESN
9.	4106-01004-06	Sh. Metal Screw, #6 x 3/8 P-PH-ST
10.	A-14231	LED Assembly
11.	A-14232	Photo Transistor Assembly
12.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH
13.	03-8506-1	Opto Mounting Base, White
14.	03-8506	Opto Mounting Base, Black
15.	H-16335	Cable Assembly

A-16262
Crypt Ball Popper Assembly

(Parts listed replace same items of **A-16261**)

Item	Part Number	Description
1.	A-16139	Ball Popper Sub-Assy.
2.	AE-26-1200	Coil Assembly

A-16263
Castle Ball Popper Assembly

(Parts listed replace same items of **A-16261**)

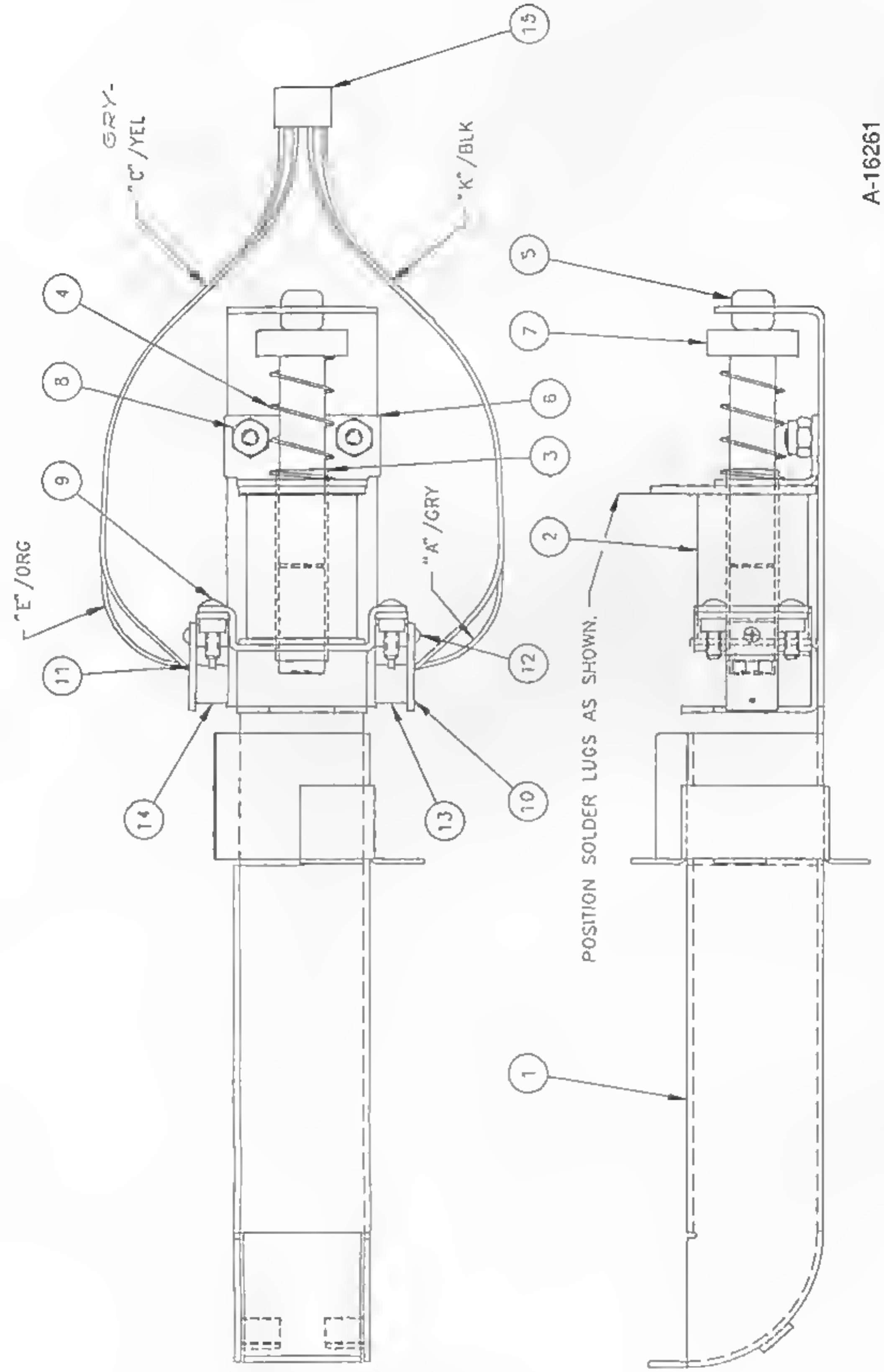
Item	Part Number	Description
1.	A-16162	Ball Popper Sub-Assy.
2.	AE-26-1500	Coil Assembly

A-16256
Wire Ramp Ball Popper Assembly

(Parts listed replace same items of **A-16261**)

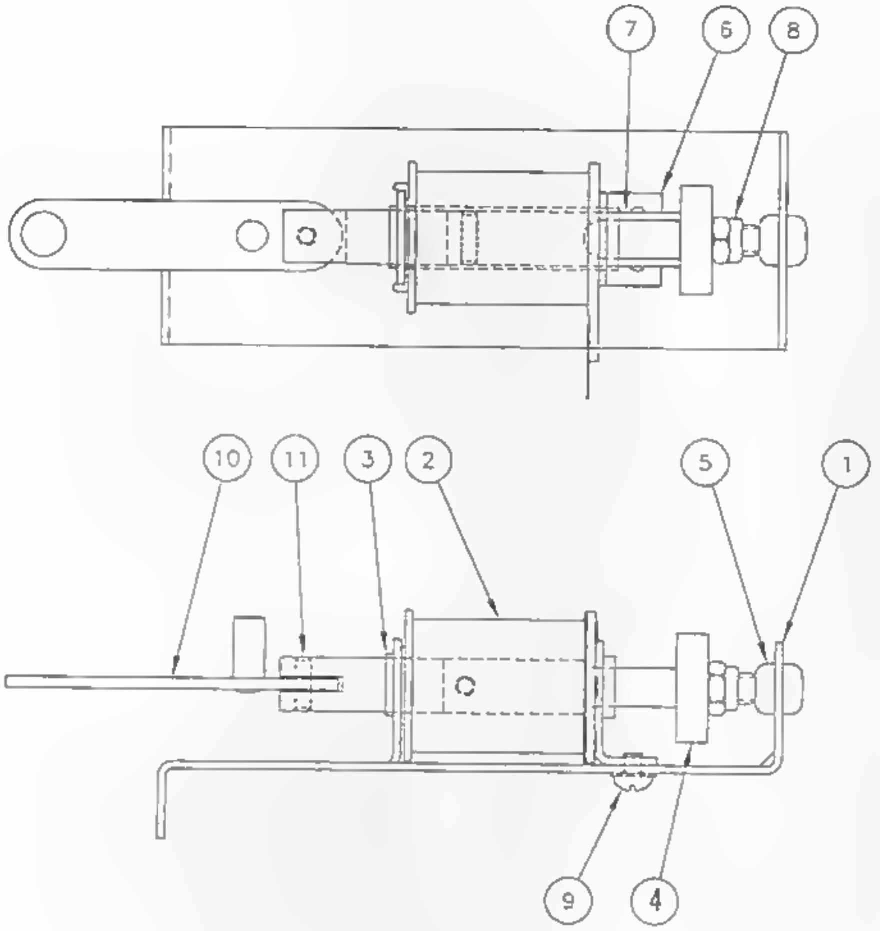
Item	Part Number	Description
1.	A-16143	Ball Popper Sub-Assembly
2.	AE-23-800	Coil Assembly
3.	01-11115	Plate-Clamp Supp.
* 16.	4008-01003-04	Mach. Screw, #8-32 x 1/4 P-PH-S
* 17.	03-7655-16	Wire Harness Clip
* 18.	4006-01027-04	Mach. Screw, #6-32 x 1/4 P-RWH
* 19.	H-16229	Playfield Opto Cable

* Not Shown.


15
GRY-
"C"/YEL
"K"/BLK
5
4
7
8
6
3
9
2
"E"/ORG
"A"/GRY
11
12
14
13
10
POSITION SOLDER LUGS AS SHOWN.
1

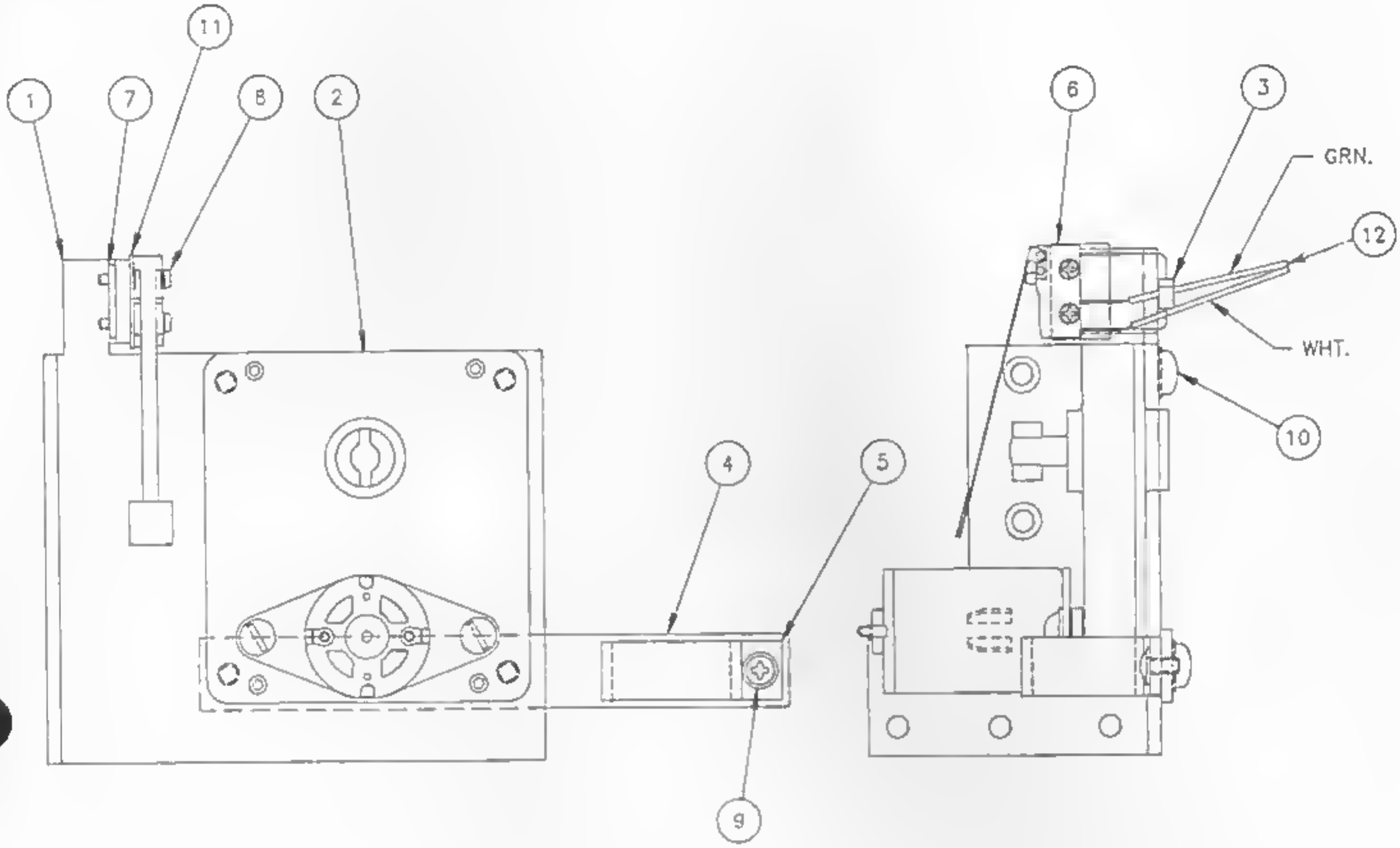
A-16261
Coffin Ball Popper Assembly

A-16245 Entry Ramp Mechanism Assembly



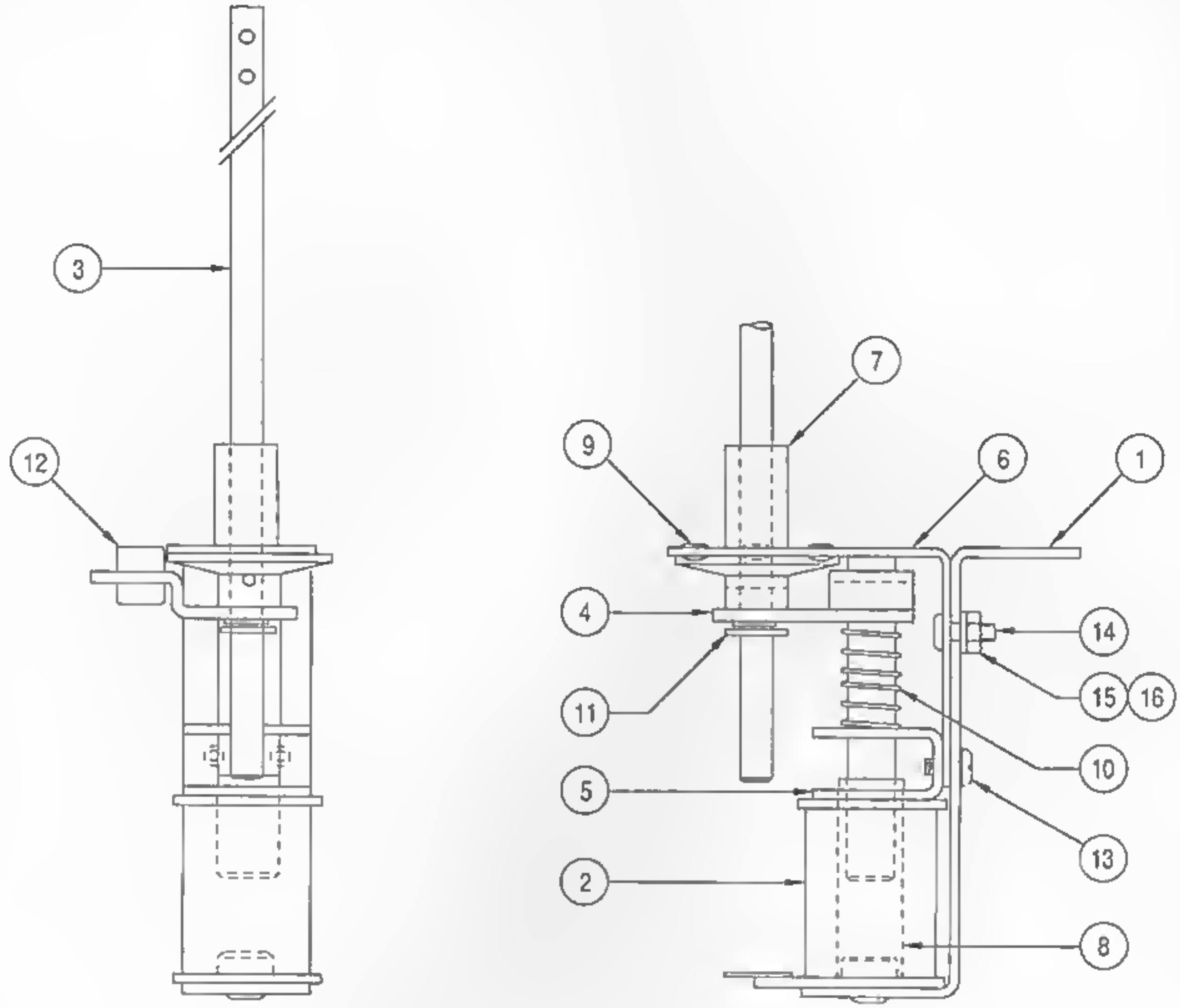
Item	Part Number	Description
1.	01-11081	Coil Mounting Bracket
2.	AE-26-1500	Coil Assembly
3.	03-7067	Coil Tubing
4.	02-2963	Bell Armature Stop
5.	23-6420	Rubber Grommet
6.	01-8-508-T	Solenoid Bracket
7.	A-16150	Solenoid Plunger Sub-Assy.
8.	4420-01119-00	Nut, 1/4-20 ESN
9.	4008-01017-03	Mach. Screw, #8-32x3/16 P-RH-S
10.	A-16147	Link Sub-Assy-Entry Ramp
11.	20-8716-5	Roll Pin, 3/32 x 7/16"

A-16050 Motor Assembly

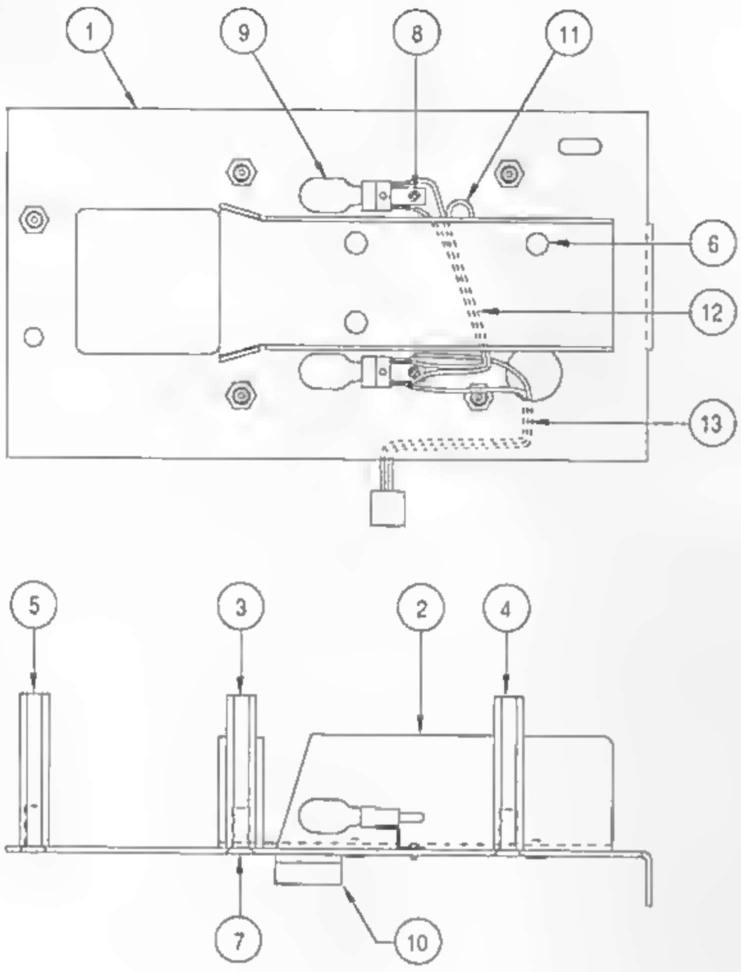


Item	Part Number	Description
1.	01-11086	Motor Mounting Bracket
2.	14-7981	Motor
3.	5070-09054-00	Diode 1N4004
4.	01-11116	Plate-Cable Supp.
5.	03-7655-16	Clip
6.	5647-12693-14	Subminiature Switch
7.	01-8240	Nut Plate
8.	4002-01105-08	Mach. Screw #2-56 x 1/2 P-PH-S
9.	4006-01027-04	Mach. Screw #6-32 x 1/4 RWH
10.	4010-01006-08	Mach. Screw #10-32 x 1/2 P-PH-S
11.	01-8600	Insulator
12.	H-16437	Cable Assembly

A-16265 Up/Down Post Assembly

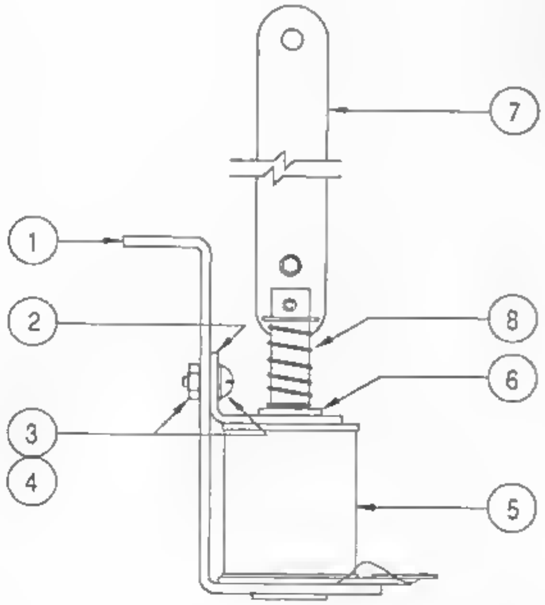


Item	Part Number	Description	Item	Part Number	Description
1.	B-7572-1	Bracket & Stop Assembly	9.	07-6688-19N	Rivet, 1/8 x 7/32" Long
2.	AE-26-1500	Coil Assembly	10.	10-399	Compression Spring
3.	A-16146	Up/Down Post Assembly	11.	20-8712-25	"E" Retaining Spring
4.	A-16153	Link Up/Down Sub-Assy.	12.	23-6420	Rubber Grommet
5.	01-11112	Coil Bracket	13.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH-S
6.	01-11080	Support Bracket	14.	4008-01005-06	Mach. Screw, 8-32 x 3/8 P-PH-S
7.	03-7065	Kick-Off Bushing	15.	4408-01128-00	Nut 8-32 KEPS
8.	03-7066	Coil Tubing	16.	4701-00003-00	Lockwasher #8 Split



A-16260
Coffin Plate Assembly

Item	Part Number	Description
1.	01-11133	Coffin Mounting Plate
2.	01-11075	Coffin Trough
3.	02-4252-66	F-F Spacer, #6-32 x 1.66
4.	02-4252-67	F-F Spacer, #6-32 x 1.60
5.	02-4252-68	F-F Spacer, #6-32 x 1.72
6.	07-6688-18N	Rivet, 3/16 x 1/8 Nickel
7.	4006-01041-06	Mach. Screw, #6-32 x 3/8
8.	4006-01003-04	Mach. Screw, #6-32 x 1/4
9.	A-12336-1	Socket & Bulb Assembly
10.	03-7722-4	Kwick Klip
11.	20-8790-1	Nylined Bearing
12.	CW-30022-4	Wire Jmp., Yellow
13.	H-16300	Flashlamp Cable

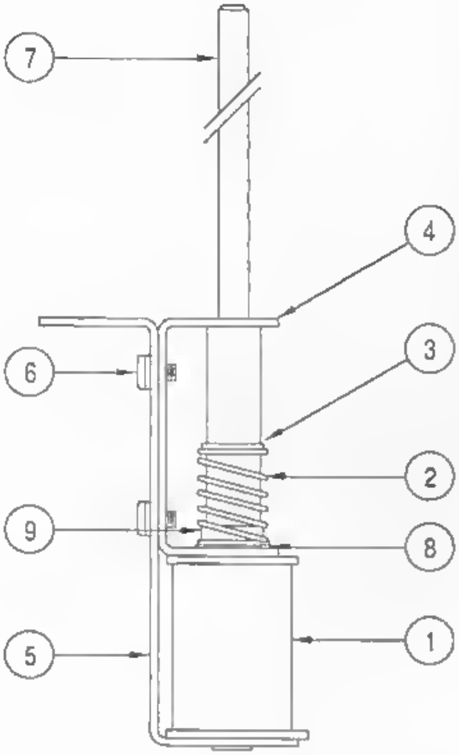


B-13935
Coil & Bracket Assembly

Item	Part Number	Description
1.	B-7572-1	Bracket & Stop Assembly
2.	01-8-508-S	Coil Retaining Bracket
3.	4006-01017-06	Mach. Screw, 6-32 x 3/8
4.	4406-01119-00	Nut, 6-32 ESN
5.	AE-26-1500	Coil Assembly
6.	03-7066	Coil Tubing

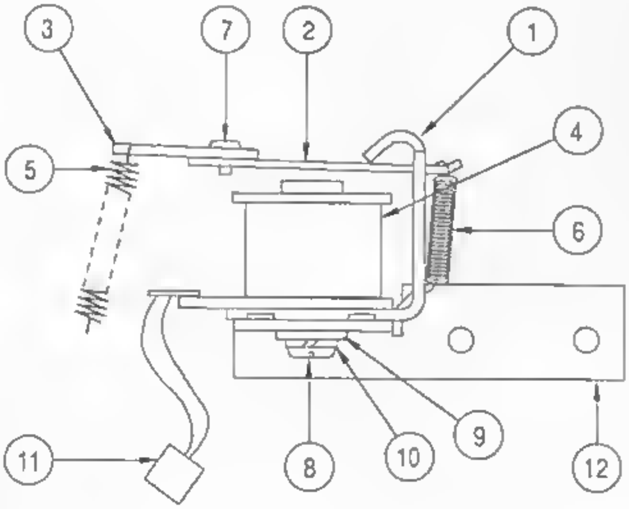
Associated Parts:

Item	Part Number	Description
7.	A-16269	Link & Plunger Assembly
8.	10-128	Spring



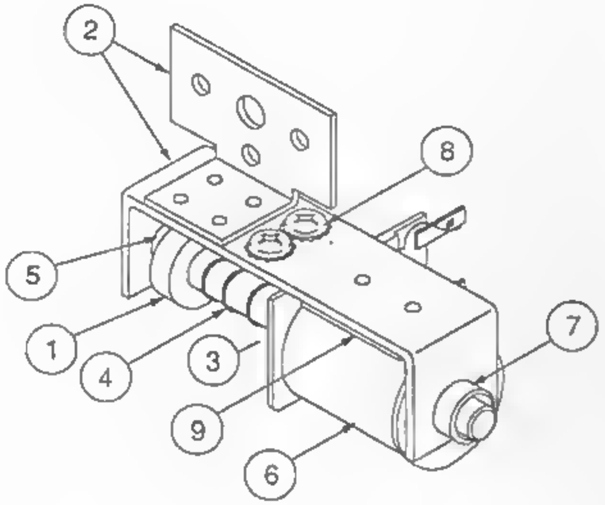
A-16268
Disappear Post Assembly

Item	Part Number	Description
1.	AE-26-1500	Coil Assembly
2.	10-135	Spring
3.	20-8712-43	"E"-Ring, 7/16" Shaft
4.	01-10008	Coil Stop Bracket
5.	B-7572-1	Bracket & Stop Assembly
6.	4006-01005-04	Mach. Screw, #6-32 x 1/4 P-PH-S
7.	02-4720	Disappearing Post
8.	01-10024	Insulator
9.	03-7066-3	Tubing, 1-7/8" Long



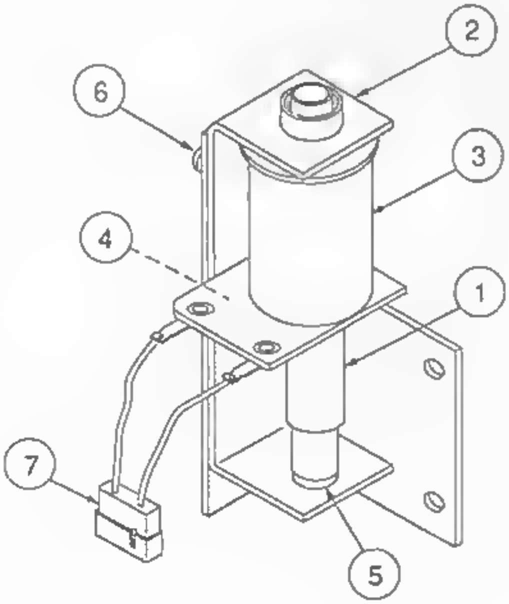
A-16246
Ball Gate Actuator Assembly

Item	Part Number	Description
1.	A-6892	Frame & Eyelet Assembly
2.	A-15821	Armature Sub-Assembly
3.	01-11166	Armature Tip
4.	A-14406	Coil Assembly
5.	10-120	Spring
6.	10-194	Extension Spring
7.	4006-01003-03	Mach. Screw, 6-32 x 3/16 P-PH-S
8.	4008-01021-07	Mach. Screw, 8-32 x 7/16 P-RH-BR
9.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
10.	4701-00003-00	Lockwasher #8 Split
11.	H-16299	Gate Cable
12.	01-11076	Support Bracket



A-14525
Kicker Bracket Assembly

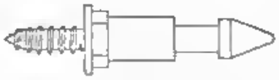
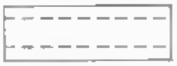
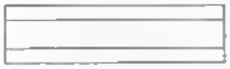
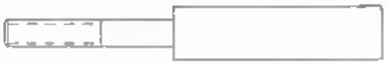
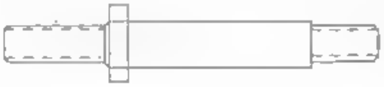
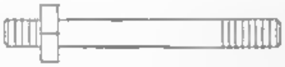
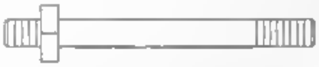
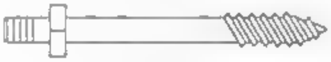
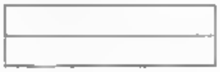
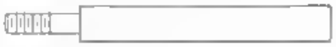
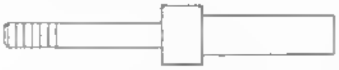
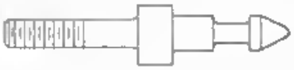
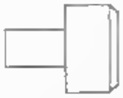
Item	Part Number	Description
1.	A-6306-2	Bell Armature Assembly
2.	A-14526	Mounting Bracket Assembly
3.	01-8-508-T	Solenoid Bracket
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	AE-23-800	Coil Assembly
7.	03-7067-5	Coil Tubing
8.	4008-01017-04	Mach. Screw, #8-32 x 5/16 P-RH
9.	03-8523	Insulator



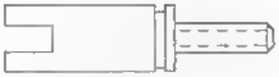
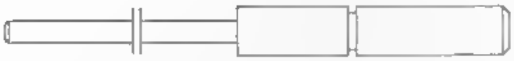
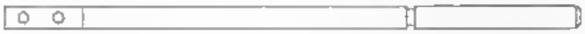
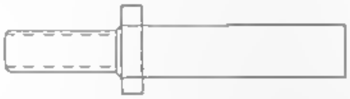
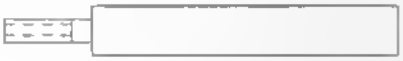
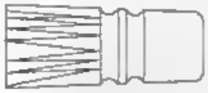
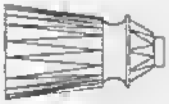
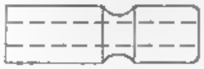
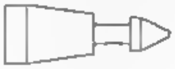
B-10686-1
Knocker Assembly

Item	Part Number	Description
1.	A-5387	Coil Plunger Assembly
2.	B-7409-2	Mtg. Bracket Assembly
3.	AE-23-800	Coil Sub-Assembly
4.	01-8-508-T	Coil Retaining Bracket
5.	23-6420	Rubber Grommet
6.	4008-01017-06	Mach. Screw, 8/32 x 3/8
7.	H-11835	Knocker Cable
8.	03-7067-5	Coil Tubing

Metal & Plastic Posts

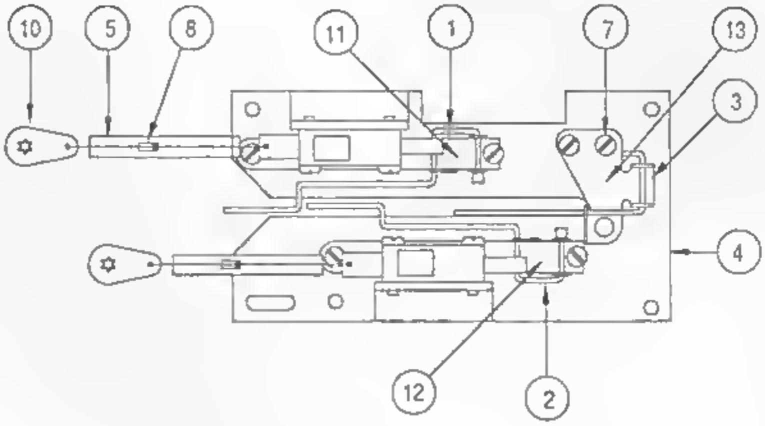
	Part Number	Description / Quantity
	02-3905	Bumper Post #8 WS (6)
	02-4020	Support Post (8)
	02-4252-10	Spacer 6-32 x 5/8" (3)
	02-4252-18	Spacer 6-32 x 1-1/8" (2)
	02-4252-38	Spacer 6-32 x 2-3/8" (1)
	02-4252-66	Spacer 6-32 x 1.66" (2)
	02-4252-67	Spacer 6-32 x 1.60" (2)
	02-4252-68	Spacer 6-32 x 1.72" (1)
	02-4322-20	MF Spacer #8-32 x 3.31" (1)
	02-4342-1	Bumper Post, 6-32 x 1/2" (2)
	02-4424-1	Post 6-32/8-32 2-1/32" (18)
	02-4425-1	Post 8-32/ #8-32 2-13/64" (4)
	02-4425-2	Post 8-32/ #8-32 2-13/64" (2)
	02-4426-1	Post #6-32 /8 1-29/32" (6)
	02-4436-7	F-F Spacer, 8-32 x 1-1/2" (1)
	02-4436-12	F-F Spacer, 8-32 x 1-3/8" (1)
	02-4657	Mounting Post, 6-32 x 4.38" (1)
	02-4659	Mini Post (8)
	02-4660	Single Bumper Post (2)
	02-4703	Armature Stop (1)

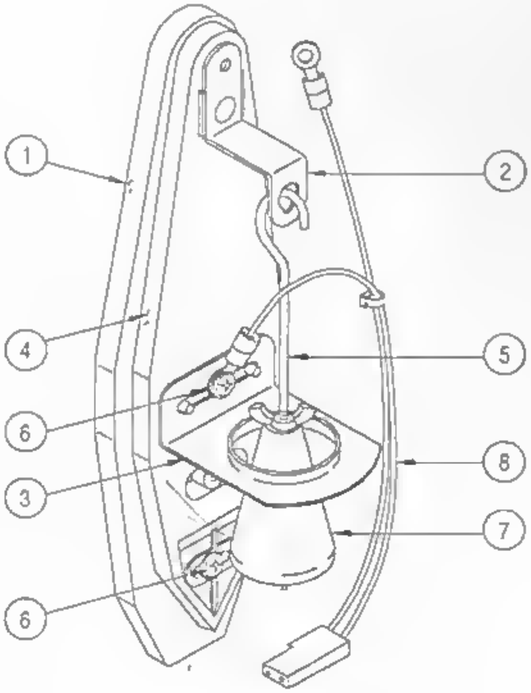
Metal & Plastic Posts (Continued)

	Part Number	Description / Quantity
	02-4706	Post Lift Ramp (1)
	02-4720	Disappearing Post (1)
	02-4732	Up/Down Post (1)
	02-4748	Bumper Post (1)
	02-4765-1	Mounting Post, 8-32 x 3.62" (1)
	02-4765-2	Mounting Post, 8-32 x 2.75" (1)
	02-4765-3	Mounting Post, 8-32 x 2.81" (1)
	02-4765-4	Mounting Post, 8-32 x 2.68" (1)
	02-4765-5	Mounting Post, 8-32 x 4.81" (1)
	03-8130-13	Double Star Bumper Post, Clear (1)
	03-8319-9	Star Post #8 (19)
	03-8365-9	Post 3/8 x 1-3/16", Clear (19)
	03-8044-9	Post 3/8 x 1-3/16",Tr. Red (1)

C-11615
Switch & Plate Assembly

Item	Part Number	Description
1.	12-6546	Wire Form
2.	12-6547	Wire Form
3.	12-6747	Wire Form
4.	B-11616	Bracket & Mtg. Plate Assy.
5.	RM-21-03	Coil Tubing
6.	4004-01003-10	MS 4-40 x 5/8" Long
7.	4005-01005-02	MS 5-40 x 1/8 Long
8.	5070-09054-00	Diode 1N40004
9.	5647-09957-00	Micro Switch
10.	5825-09372-00	Solder Lug
11.	01-60-A	Switch Bracket
12.	01-60-F	Switch Bracket
13.	01-3411	Switch Bracket





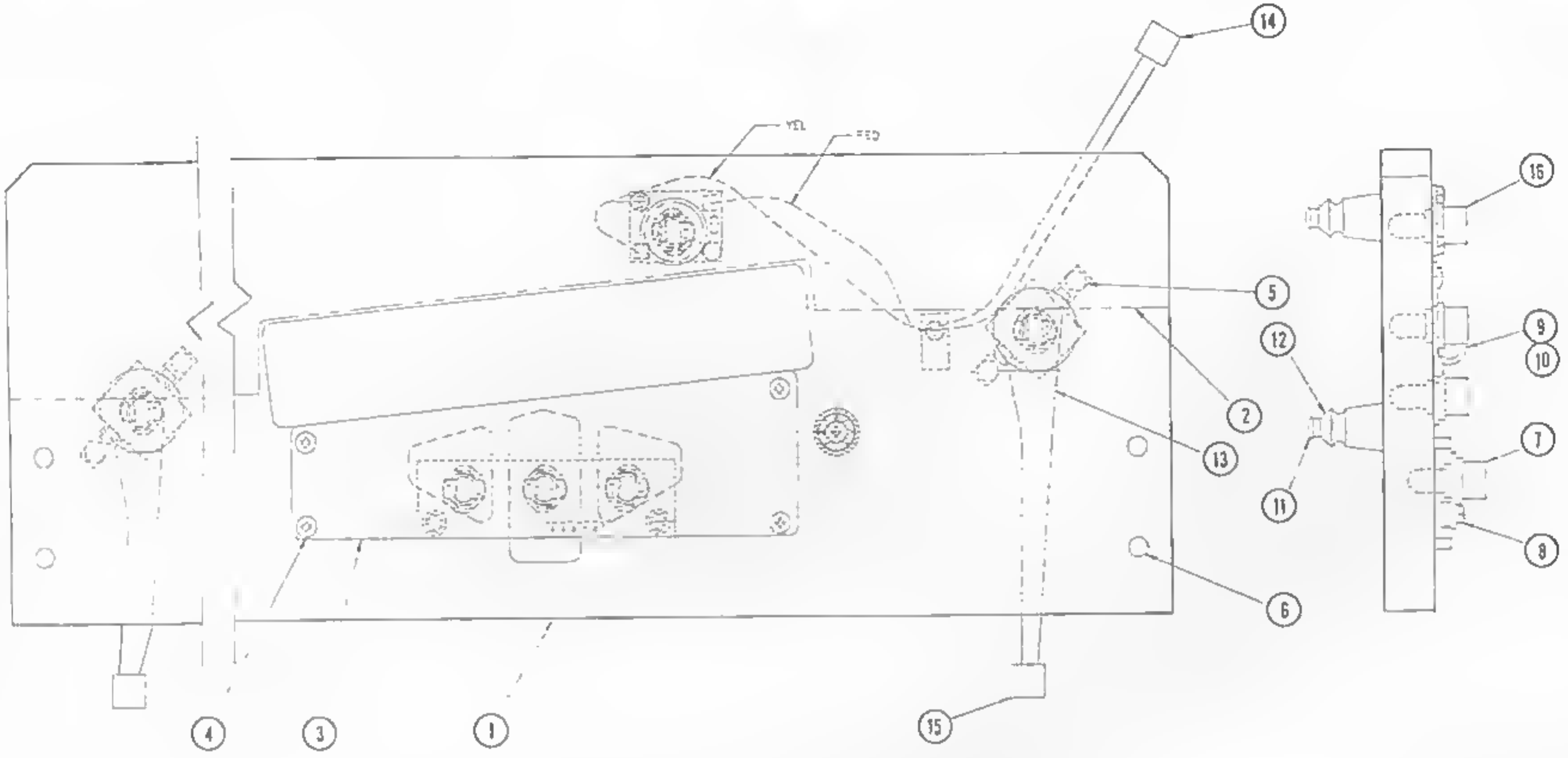
A-15361
Tilt Mechanism Assembly

Item	Part Number	Description
1.	A-15360	Mount Plate, Tilt Mech.
2.	01-3444	Bracket, Tilt Upper
3.	01-3445	Bracket, Tilt Lower
4.	03-8668	Pendulum, Tilt Mech.
5.	12-6331	Wire, Plum Bob
6.	4006-01027-06	MS, 6-32 x 3/8 PH-WHD

Associated Parts

Item	Part Number	Description
7.	20-6502-A	Plum Bob
8.	H-15478	Cable

A-16399 Back Panel & Decal Assembly



Item	Part Number	Description
1.	A-116426	Back Panel
2.	31-1745-1	Decal, Top
3.	31-1745-5	Playfield Plastic
4.	4106-01033-08	Sh. Metal Screw. #6 x 1/2 P-TH-A
5.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH-A
6.	4506-01106-16B	SSS #6-32 X 1"
7.	A-16337-1	3-Lamp PCB w/Spacers
8.	4106-01115-16	Sh. Metal Screw., #6 x 1" PL-HWH-YEL
9.	03-7655-4	Hamess Clip, 1/4"
10.	4106-01115-06Y	Sh. Metal Screw, #6 x 3/8 PL-HWH-A
11.	4108-01001-24	Sh. Metal Screw, #8 x 1-1/2 P-PH-A
12.	03-8319-9	Star Post #8, Tr. Red
13.	C-13337	Single Flashlamp Assembly
14.	H-16295	Cable Assembly
15.	H-16300	Cable Assembly
16.	B-12224	Single Lamp Assembly

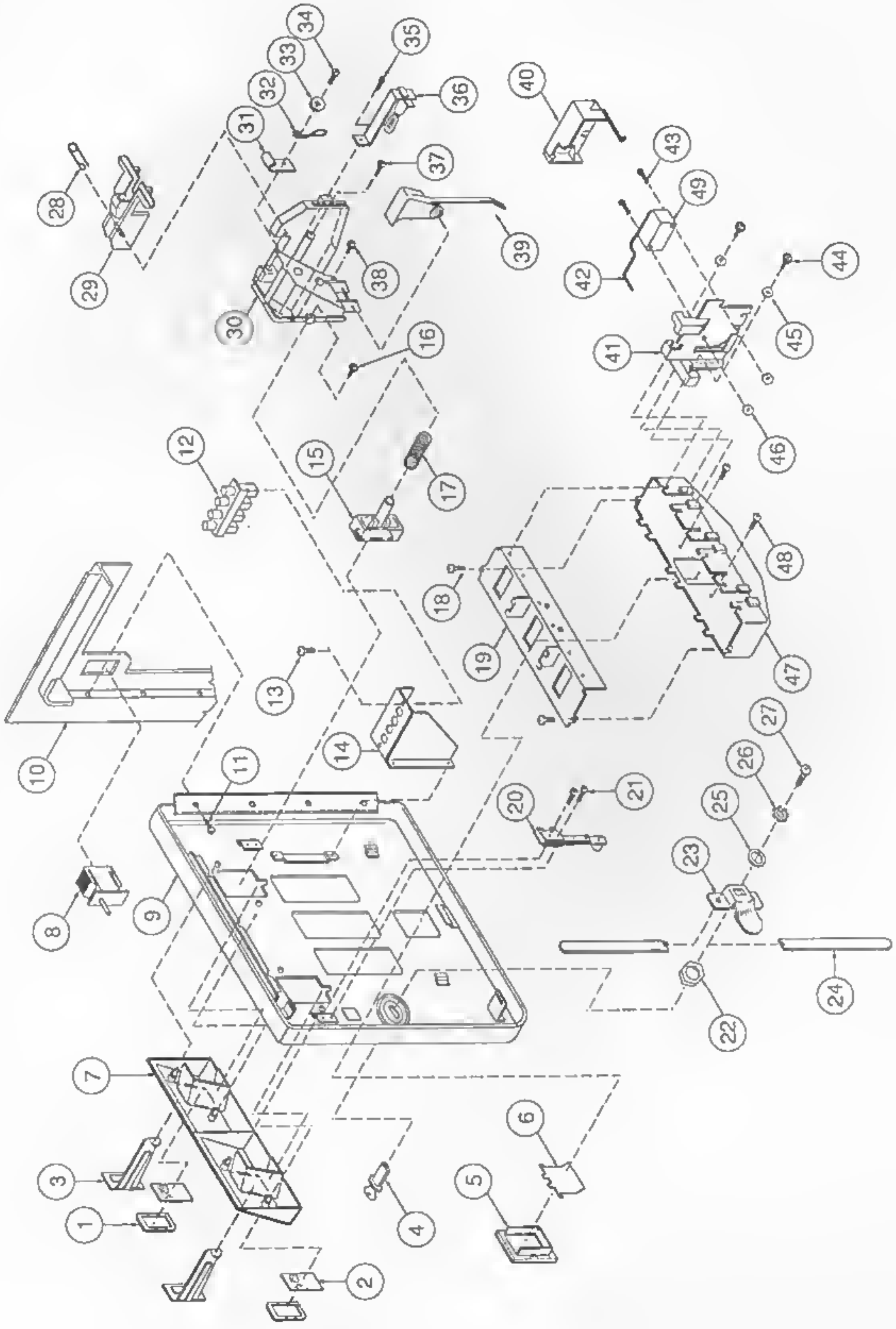
Coin Door Assembly

A-14148-1 U.S.A. Door with Decals

09-17002-x 2-Chute Door
09-17003-x 3-Chute Door
("x" is the country designator)

Item	Part No.	Description	Quantity
1	27-1038	Button Cover	2 or 3
2	27-1041-1→58	Price Panel	2 or 3
3	27-1026-1→17	Coin Entry Plate	2 or 3
4	27-1016	Lock Assembly	1
5	27-1061-1	Coin Return - Bezel	1
6	27-1062	Coin Return Flap	1
7	27-1021	Button Housing - 2-slot	1
	27-1022	Button Housing - 3-slot	1
8	27-1111	Interlock Switch	1
9	27-1006-1	Coin Door , 2-Slot	1
	27-1007-1	Coin Door , 3-Slot	1
10	27-1005	Coin Door Frame	1
11	27-1003	M/C Screw, 6-32 x 3/16	4
12	5641-12724-00	Diagnostic Switch	1
13	27-1101	M/C Screw, 4-40 x 1/4	2
14	01-9885	Bracket, Diagnostic Switch	1
15	27-1037	Plastic Button	1
16	27-1078	M/C Screw, 6-32 x 3/8	2 or 3
17	27-1039	Conical Spring	2 or 3
18	27-1079	Self-tapping Screw, #6 x 1/4	2
19	27-1077-1	Coinbox Cover	1
20	27-1066	Slam Switch	1
21	27-1067	M/C Screw, 4-40 x 1/2	2
22	27-1017	Nut (key)	1
23	27-1012	Locking Cam	1
24	27-1011	Locking Arm	2
25	27-1020	Washer	1
26	27-1018	Star Washer	1
27	27-1019	M/C Screw, 1/4-28 x 5/16	1
28	27-1089	R-Ring	1
29	27-1083	Retainer	1
30	27-1081	Coin Inlet Chute	2 or 3
31	27-1088	Cable Clamp	2 or 3
32	27-1025	Key Hook	1
33	27-1086	Washer, #6	2 or 3
34	27-1078	M/C Screw, 6-32 x 3/8	1 or 2
	27-1113	M/C Screw, 6-32 x 7/16	1
35	27-1079	Self-tapping Screw, #6 x 1/4	2 or 3
36	27-1084	Lamp Socket	2 or 3
	27-1085	Lamp	2 or 3
37	27-1096	Self-tapping Screw, #5 x 3/8	2 or 3
38	27-1087	M/C Screw, 6-32 x 5/8	2 or 3
39	27-1082	Lever Arm	2 or 3
40	27-1097	Switch Cover	2 or 3
41	27-1091-1	Coin Accept Chute	2 or 3
42	27-1075	Wire Form (Small)	2 or 3
	or		
	27-1093	Wire Form (Large)	
43	27-1094	M/C Screw, 4-40 x 7/8	4 or 6
44	27-1087	M/C Screw, 6-32 x 5/8	4 or 6
45	27-1086	Washer, #6	4 or 6
46	27-1095	Nut, 4-40 ESNA	4 or 6
47	27-1076-1	Coin Return Box	1
48	27-1078	M/C Screw, 6-32 x 3/8	2
49	27-1092	Microswitch	2 or 3

Coin Door Assembly

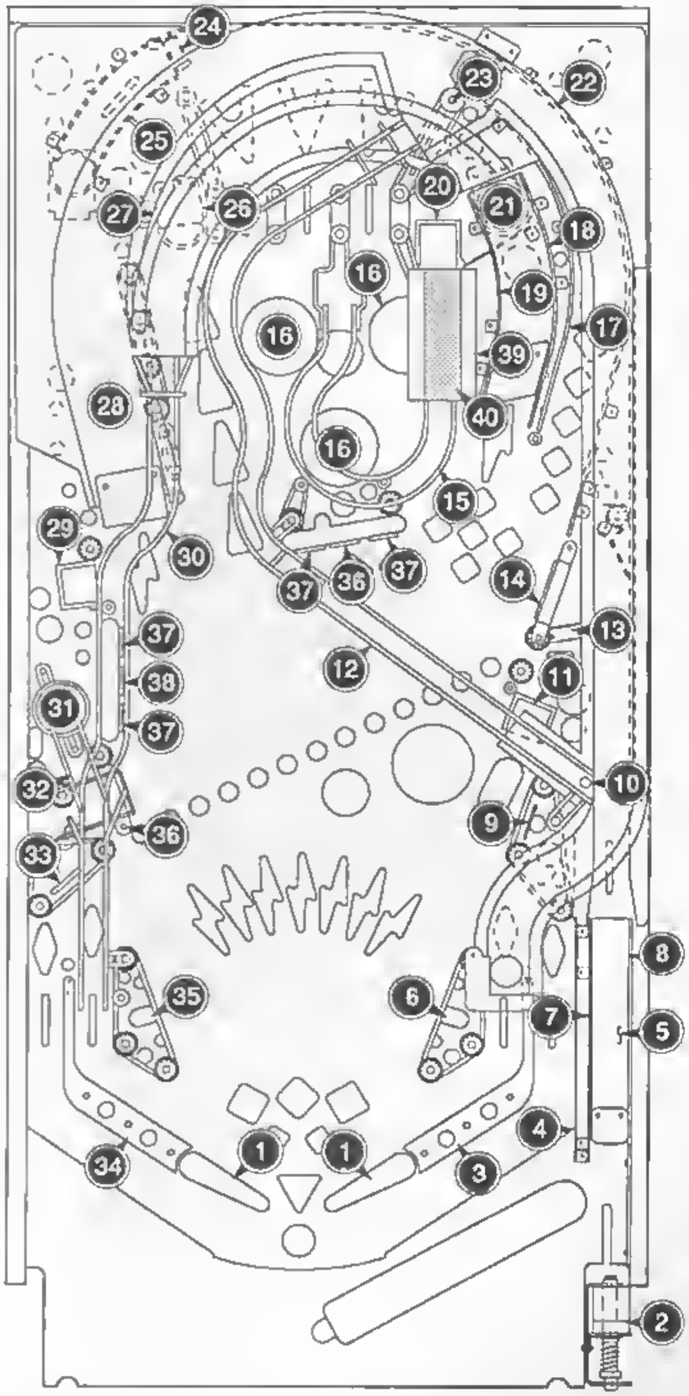

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

UPPER PLAYFIELD PARTS LOCATIONS

Item	Part Number	Description
1	20-9250-4	Flipper Shaft & Paddle
2	A-14525	Shooter Kicker Assy.
3	A-16306-1	Ball Guide
4	01-11098	Ball Guide
5	A-16247	Entry Ramp Assy
5a)	A-16245	Enter Ramp Mech.
6	B-12665	Right Sling
6a)	B-9362-R-3	Coil & Brkt Assy
7	01-11092	Ball Guide
8	A-16142	Ball Guide
9	12-6466-5	Wireform
10	A-16268	Dis. Castle Release Post
11	A-16263	Castle Popper
12	12-7055	Center Wire Ramp
13	A-16258	Gate & Wire Assy
14	A-16259	Gate & Wire Assy
14a)	B-13935	Coil & Brkt. Assy
15	12-7058	Coffin Wire Ramp
16	A-9415-2	Jet Bumper
17	A-16141	Ball Guide
18	A-16144	Ball Guide
19	01-11099	Ball Guide
20	A-16261	Coffin Popper
21	A-16264	Lift Ramp Assy
22	A-16145	Ball Guide
23	A-16265	Up/Down Post Diverter
24	A-16267	1-bank Drop Target
25	01-11097	Ball Guide
26	01-11904	Ball Guide
27	01-11903	Ball Guide
28	01-11283	Bottom Opto Mtg. Brkt.
29	A-16262	Crypt Popper
30	12-7056	Left Wire Ramp
31	A-16256	Wire Ramp Popper
32	12-7057	Ball Popper Wire Ramp
33	01-11095	Ball Guide
34	A-16306-2	Ball Guide
35	B-12665	Left Sling
35a)	B-9362-L-2	Coil & Brkt. Assy.
36	A-16246	Ball Gate Actuator
36a)	A-16257	Gate & Wire Assy
37	A-14691-2	Green Standup Tgt.
38	A-14691-4	Red Standup Tgt.
39	A-16260	Coffin Plate Assembly
40	A-16398	Cover-Coffin & Decal Assy.

NOT SHOWN

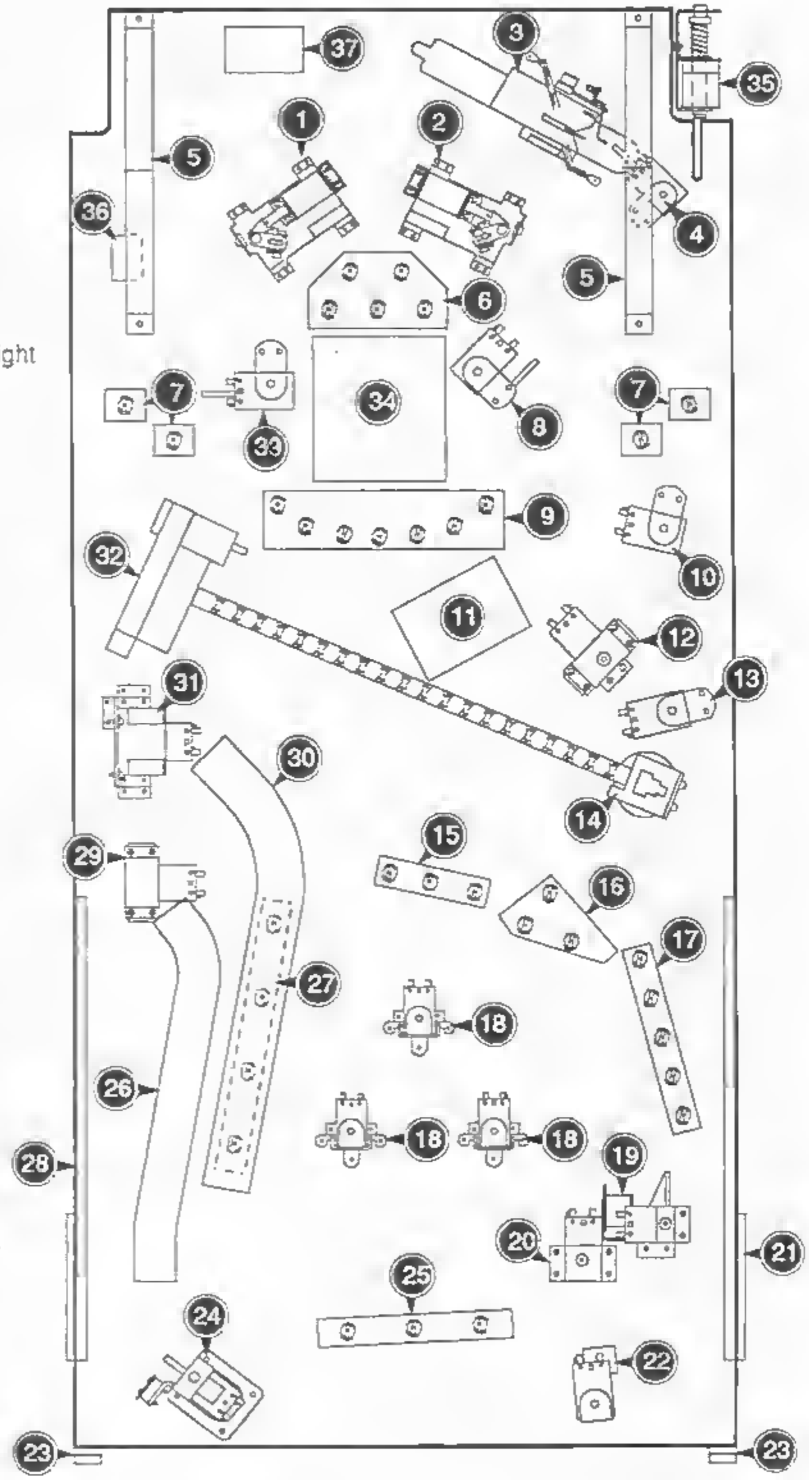
A-13204-50001	Bottom Arch Assy.
15-50001-1	Instruction Card
20-9041	Tinnerman Speednut
20-9045	Instruction Card Cover
23-6313-1	Rubber Grommet
31-1008-50001	Screened Bottom Arch
A-15894	Flipper Opto Cabinet Switch Bd.
01-3569-1	Ball Return Runway
03-8860-1	*Full Playfield Mylar
03-8860-2	Jet Bumper Mylar
03-8860-3	Left Return Mylar
03-8860-4	Right Return Mylar
20-6500	Steel Ball



*The Dracula hardcoat playfield does not require a full mylar. However Mylars can be purchased through your local Williams Distributor.

LOWER PLAYFIELD PARTS

Part Number	Description
A-15205-L-4	Lower Left Flipper Assembly
A-15205-R-4	Lower Right Flipper Assembly
C-11615	Micro-Switch Plate
C-9638	Multiball Eject Assembly
10-128	Spring
B-9362-R-3	Coil & Bracket Assembly
01-10721	Safety Bracket (2 Used)
A-16111	5-Lamp Board
B-12224	Single Lamp Board
B-12665	Kicker Arm (Slingshot) Assy., Right
B-9362-R-3	Coil & Bracket Assembly
10-128	Spring
B-8284-1	Kicker Switch Assembly
A-16110	7-Lamp Board
A-16268	Disappear Post Assembly
A-15646	24-Opto Switch Board
A-16263	Castle Ball Popper Assembly
A-16269	Link & Plunger Assembly
B-13935	Coil & Bracket Assembly
A-16266	Coil Magnet & Screw Assembly
A-15470	3-Lamp Board
A-16108	4-Lamp Board
A-16109	5-Lamp Board
A-9415-2	Jet Bumper Coil Assy. (3 Used)
B-12030-2	Switch & Diode Assy. (3 Used)
A-16264	Lift Ramp Assembly
A-16261	Coffin Ball Popper Assembly
A-15421-2	Playfield Slide Assembly, Right
A-16265	Up/Down Post Assembly
01-10726	Rear Guide Leg (2 Used)
A-16267	1-Bank Drop Target Assembly
A-16106	3-Lamp Board
A-16252	Lwr. Center Ramp Assembly
A-16107	4-Lamp Board
A-15421-1	Playfield Slide Assembly, Left
A-16262	Crypt Ball Popper Assembly
A-16253	Lower Left Ramp
A-16256	Wire Ramp Ball Popper Assy.
A-16050	Motor Assembly
B-12665	Kicker Arm (Slingshot) Assy., L.
B-9362-L-2	Coil & Bracket Assembly
10-128	Spring
B-89284-1	Kicker Switch Assembly
A-15430	10-Opto Switch Assembly
A-14525	Kicker Bracket Assembly
A-15542	Motor EMI Board
C-13509	High Current Driver Assembly

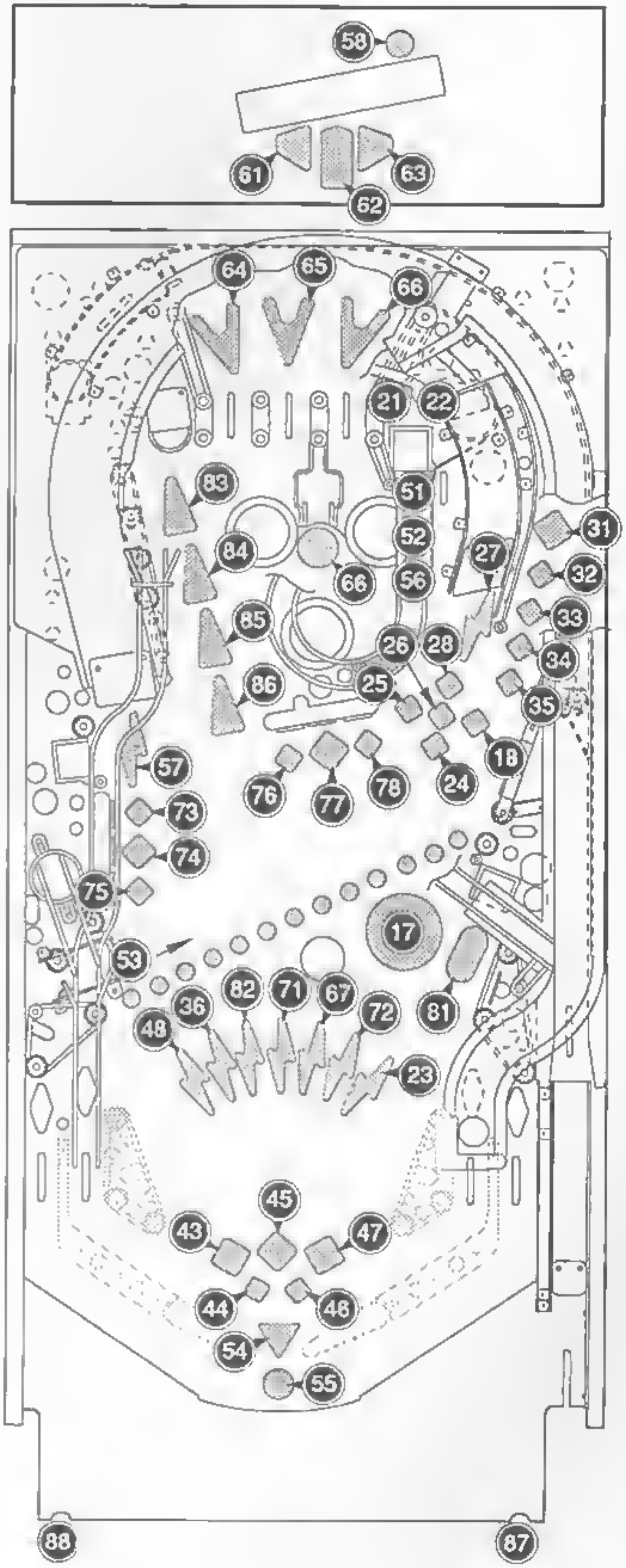


Underside of Playfield, Viewed in Raised Position

LAMPS LOCATIONS

Item	Bulb No.	Lamp Assy No.	Description
11-15			Not Used
16	24-6549	A-11754	R. Ramp: Lock #44
17	24-6549	A-11754	Dracula Face #44
18	24-8768	A-16108	R. Ramp: 2 Mil. #555
21	24-6549	A-16366-1	Coffin Lock 1 #44
22	24-6549	A-16366-1	Coffin Lock 2 #44
23	24-8768	A-16110	Dracul(a) #555
24	24-8768	A-16108	R. Ramp: .5 Mil. #555
25	24-8768	A-16108	R. Ramp: 1 Mil. #555
26	24-8768	A-16108	R. Ramp: 2.5 Mil. #555
27	24-8768	A-16108	R. Ramp: Double #555
28	24-8768	A-16108	R. Ramp: 1.5 Mil. #555
31	24-8768	A-16109	R. Lane: (V)ideo #555
32	24-8768	A-16109	R. Lane: V(i)deo #555
33	24-8768	A-16109	R. Lane: Vi(d)eo #555
34	24-8768	A-16109	R. Lane: Vid(e)o #555
35	24-8768	A-16109	R. Lane: Vide(o) #555
36	24-8768	A-16110	D(r)acula #555
37	24-8768	B-12224	Left Drain #555
38	24-8768	B-12224	Left Return #555
41	24-8768	B-12224	Right Return #555
42	24-8768	B-12224	Right Drain #555
43	24-8768	A-16111	Coffin M. Ball #555
44	24-8768	A-16111	Playfield 2X #555
45	24-8768	A-16111	Castle M. Ball #555
46	24-8768	A-16111	Playfield 3X #555
47	24-8768	A-16111	Mist M. Ball #555
48	24-8768	A-16110	(D)racula #555
51	24-8768	A-16523	Coffin Lamp 1 #555
52	24-8768	A-16523	Coffin Lamp 2 #555
53	24-6549	A-11905	Magnet #44
54	24-6549	A-11754	Shoot Again #44
55	24-6549	A-11754	Love Never Dies #44
56	24-8768	A-16523	Coffin Lamp 3 #555
57	24-8768	A-16511	L. Ramp Lock #555
58	24-8768	B-12224	L. Ramp Diverted #555
61	24-8768	A-16337	L. Skill 100K #555
62	24-8768	A-16337	M. Skill 1 Mil. #555
63	24-8768	A-16337	R Skill 500K #555
64	24-8768	A-16106	T. 3-lane: Left #555
65	24-8768	A-16106	T. 3-lane: Middle #555
66	24-8768	A-16106	T. 3-lane: Right #555
67	24-8768	A-16110	Drac(u)la #555
68	24-6549	A-11754	Jet Insert #44
71	24-8768	A-16110	Dra(c)ula #555
72	24-8768	A-16110	Dracu(l)a #555
73	24-8768	A-16511	Left 3-bank Top #555
74	24-8768	A-16511	Left 3-bank Middle #555
75	24-8768	A-16511	Left 3-bank Bottom #555
76	24-8768	A-16337	M. 3-bank Left #555
77	24-8768	A-16337	M. 3-bank Middle #555
78	24-8768	A-16337	M. 3-bank Right #555
81	24-6549	A-11754	Rats Mode #44
82	24-8768	A-16110	Dr(a)cula #555
83	24-8768	A-16107	T.L. Hole: Mystery #555
84	24-8768	A-16107	T.L. Hole: Carriage #555
85	24-8768	A-16107	T.L. Hole: Ex. Ball #555
86	24-8768	A-16107	T.L. Hole: Jackpot #555
87	-----	A-15896-1	Launch Ball
88	-----	20-9663-1	Game Start

A-16399 Back Panel Assy.



SOLENOID/FLASHER LOCATION

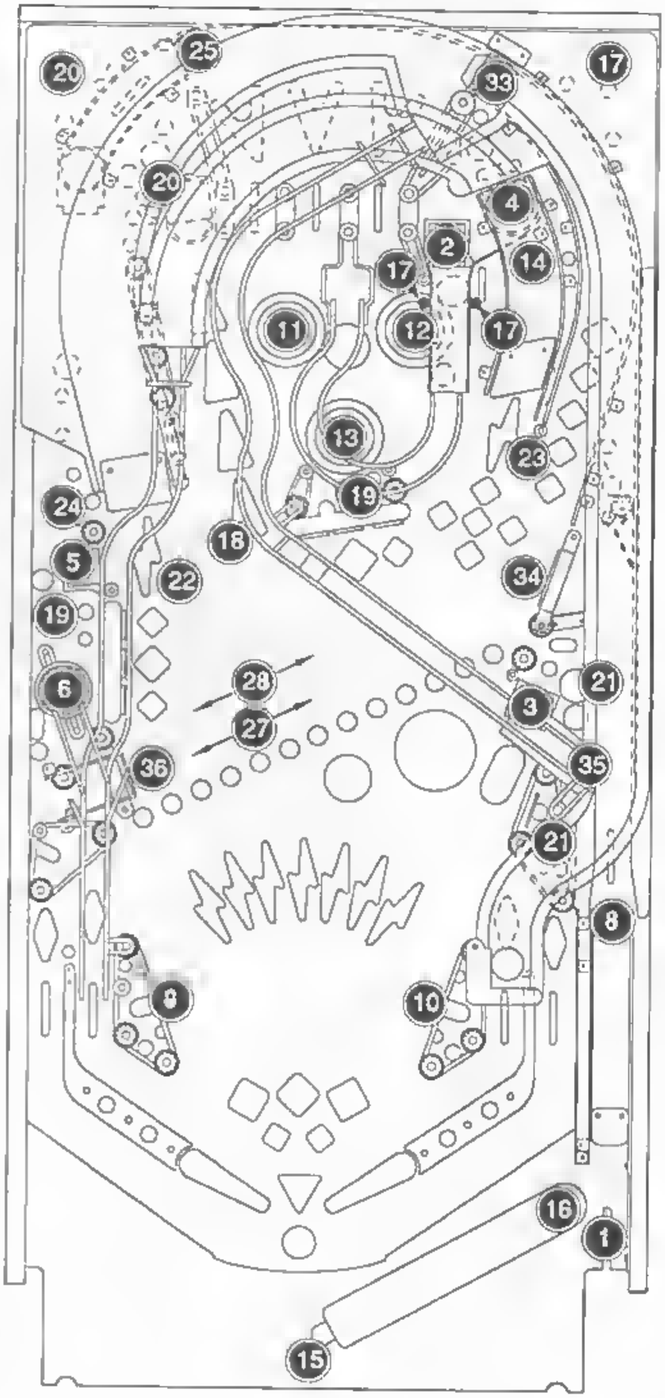
Item	Coil/Flasher No.	Assy No.	Description
01	AE-23-800	A-14525	Shooter
02	AE-24-900	A-16261	Coffin Popper
03	AE-26-1500	A-16263	Castle Popper
04	AE-26-1200	A-16264	Right Ramp Down
05	AE-26-1200	A-16262	Crypt Popper
06	AE-23-800	A-16256	Wire Ramp Ball Popper
07	AE-23-800	B-10686-1	*Knocker
08	AE-26-1500	A-16245	Shooter Ramp Entry
09	AE-26-1200	B-9362-L-2	Left Sling
10	AE-26-1200	B-9362-R-3	Right Sling
11	AE-26-1200	A-9415-2	Left Jet
12	AE-26-1200	A-9415-2	Right Jet
13	AE-26-1200	A-9415-2	Bottom Jet
14	SM1-28-900	A-16264	Right Ramp Up
15	AE-27-1200	A-8039-3	Outhole
16	AE-26-1200	B-9362-R-3	Trough
17	24-8802	A-12336-1	T.R. Corner FL #906
	24-8802	-----	Dracula FL #906
18	24-8802	A-12336-1	Jackpot FL #906
	24-8802	-----	Stoker FL #906
19	24-8704	A-8798	3-bank FL #89
	24-8802	-----	House FL #906
20	24-8704,24-8802	A-12336-1,A-8798	T.L. Corner FL#89,#906
	24-8802	-----	Mina FL #906
21	24-8704	A-8798	Castle FL #89
	24-8802	-----	Helsing FL #906
22	24-8802	A-12336-1	L. Ramp FL #906
	24-8802	-----	L. Logo FL #906
23	24-8802	A-12336-1	R. Ramp FL #906
	24-8802	-----	R. Logo FL #906
24	24-8704	A-8798	Asylum FL #89
	24-8802	-----	Renfield FL #906
25	AE-26-1200	A-16267	L. Drop Target
26	24-8802	-----	Speaker Panel FL
27	20-9831	A-16266	Magnet
28	14-7981	A-16050	Magnet's Motor
33	AE-26-1500	A-16265	Up/Dn Post Diverter
34	AE-26-1500	B-13935	Right Gate
35	AE-26-1500	A-16268	Dis. Castle Release Pst
36	A-14406	A-16246	Left Ball Gate Actuator

General Illumination

01	24-8768	-----	*Lower Playfield, Insert
02	24-8768	-----	*Upper Playfield, Insert
03	24-8768	-----	*Center Playfield, Insert
04	24-8768	-----	*Insert
05	24-8768	-----	*Cabinet, Insert

Flippers

FL-15411	A-15205-L-4	*Lower Left Flipper
FL-15411	A-15205-R-4	*Lower Right Flipper



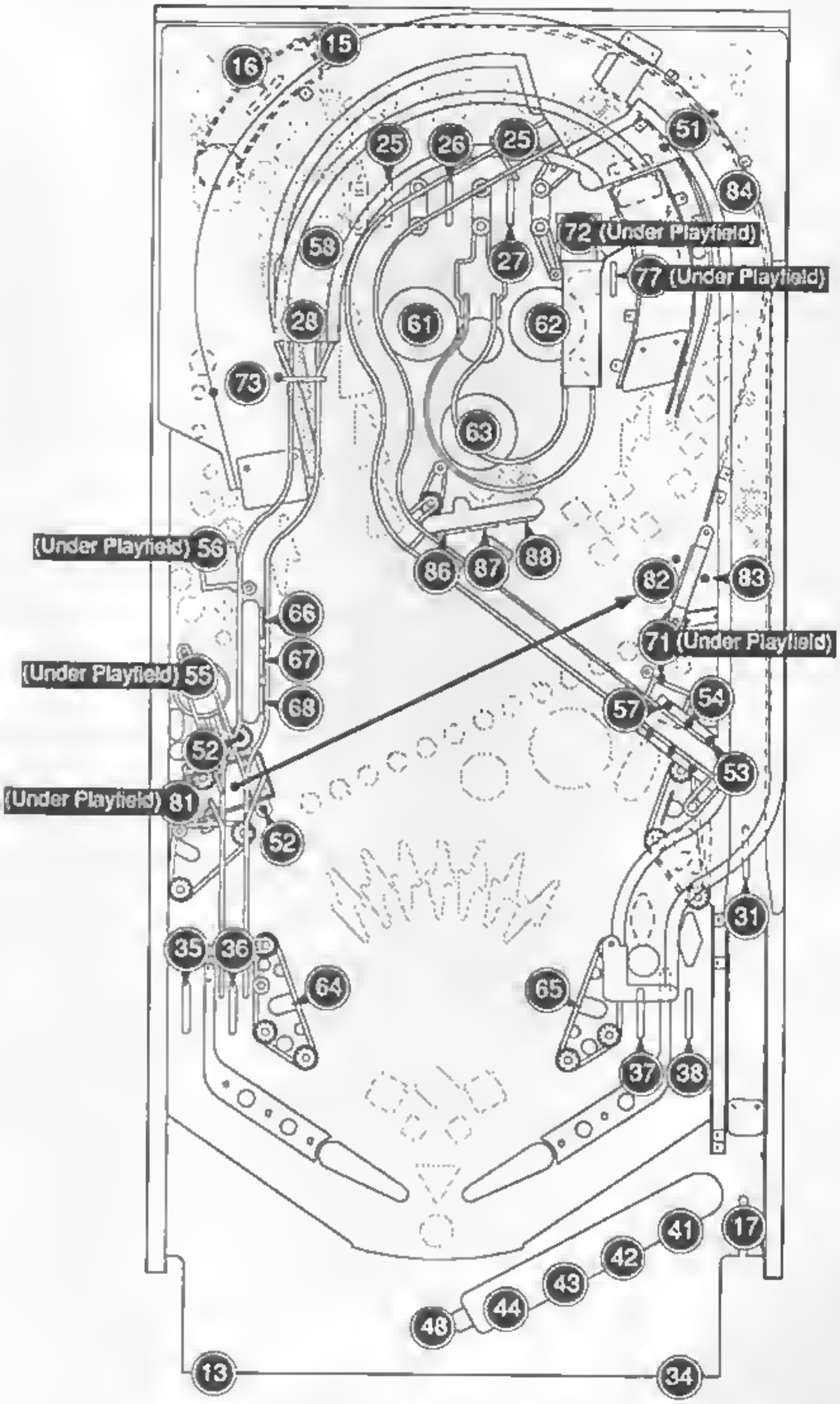
* Not Shown

SWITCH LOCATIONS

Item	Switch No.	Where Used
F1	SW-1A-193	Lwr Rt. Flipper EOS
F2	5490-12451-00	Lwr Rt. Flipper Cab.
F3	SW-1A-193	Lwr Lt. Flipper EOS
F4	5490-12451-00	Lwr Lt. Flipper Cab.
13	20-9663-1	Start Button
14	A-6502-A	†Plumb Bob Tilt
15	5647-12693-31	L. Drop Target
16	5647-12693-19	L. Drop Score
17	5647-12693-04	Shooter Lane
18		Not Used
21	SW-1A-117	†Slam Tilt
22	5643-09288-00	†Coin Door Closed
23		Not Used
24	5643-09288-00	†Always Closed
25	5647-12693-19	Top 3-lane Left
26	5647-12693-19	Top 3-lane Middle
27	5647-12693-19	Top 3-lane Right
28	5647-12693-21	R. Ramp Score
31	5647-12693-19	Under Shooter Ramp
32-33		Not Used
34	A-15896-1	Launch Ball
35	5647-12693-19	Left Drain
35	5647-12693-19	Left Return
37	5647-12693-19	Right Return
38	5647-12693-19	Right Drain
41	5647-12693-08	Trough 1 Ball
42	5647-09957-00	Trough 2 Balls
43	5647-09957-00	Trough 3 Balls
44	5647-09957-00	Trough 4 Balls
45-47		Not Used
48	5647-12133-12	Outhole
51	A-14315 (LED) A-14316 (Trans)	Opto T.R. Lane
52	A-14315 (LED) A-14316 (Trans)	Opto Mag. Lt. Pocket
53	A-14315 (LED) A-14316 (Trans)	Opto Castle 1
54	A-14315 (LED) A-14316 (Trans)	Opto Castle 2
55	A-14315 (LED) A-14316 (Trans)	Opto Wire Ramp Popper
56	A-14315 (LED) A-14316 (Trans)	Opto Crypt Popper
57	A-14315 (LED) A-14316 (Trans)	Opto Castle 3
58	5647-12693-13	Mystery Hole
61	SW-11A-37	Left Jet Bumper
62	SW-11A-37	Right Jet Bumper
63	SW-11A-37	Bottom Jet Bumper
64	SW-1A-114 (Kick) SW-1A-120 (Score)	*Left Sling
65	SW-1A-114 (Kick) SW-1A-120 (Score)	*Right Sling
66	A-14691-2	Left 3-bank Top
67	A-14691-4	Left 3-bank Middle
68	A-14691-2	Left 3-bank Bottom
71	A-14315 (LED) A-14316 (Trans)	Opto Castle Popper
72	A-14315 (LED) A-14316 (Trans)	Opto Coffin Popper
73	A-14315 (LED) A-14316 (Trans)	Opto L. Ramp Entry
74-76		Not Used

† Not Shown

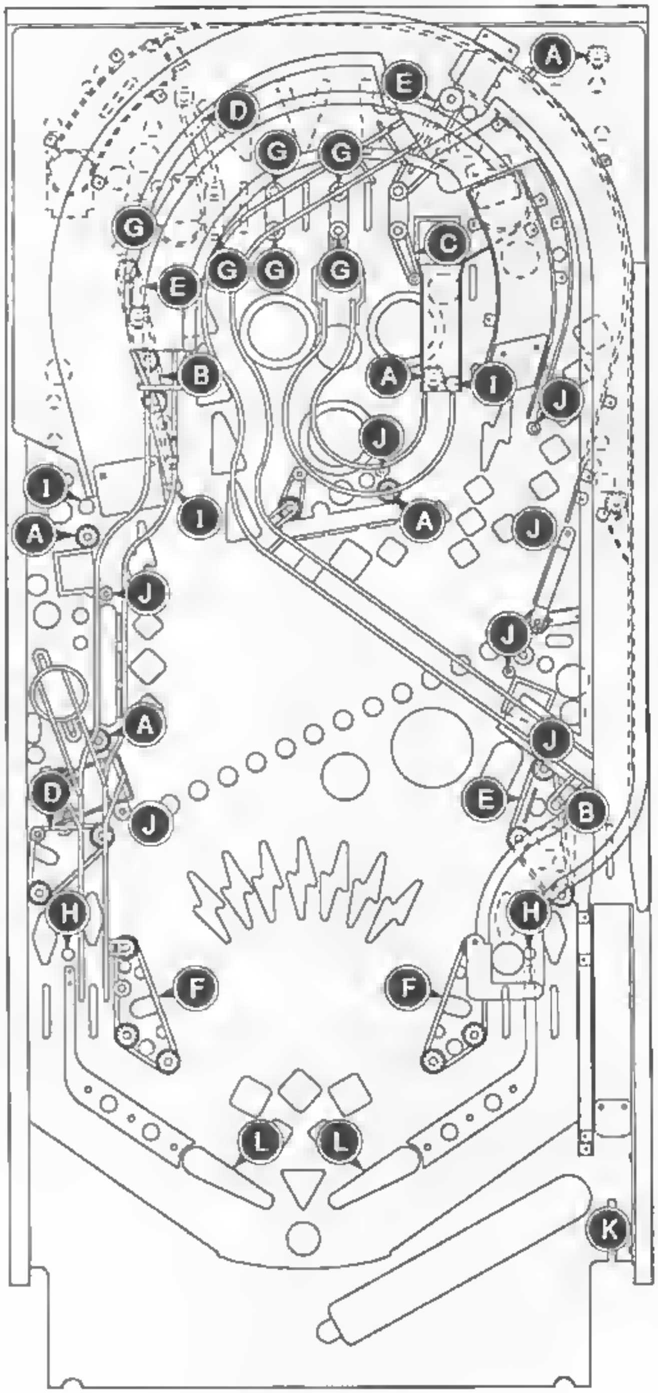
* The Score slingshot switches have diodes across them.



Item	Switch No.	Where Used
77	5647-12693-36	R. Ramp Up
78		Not Used
81	5647-12693-14	Magnet Left
82	A-14315 (LED) A-14316 (Trans)	Ball On Magnet
83	5647-12693-14	Magnet Right
84	5647-12693-21	L. Ramp Score
85	5647-12693-21	L. Ramp Diverted
86	A-14691-2	Middle 3-bank Left
87	A-14691-4	Middle 3-bank Middle
88	A-14691-2	Middle3-bank Right

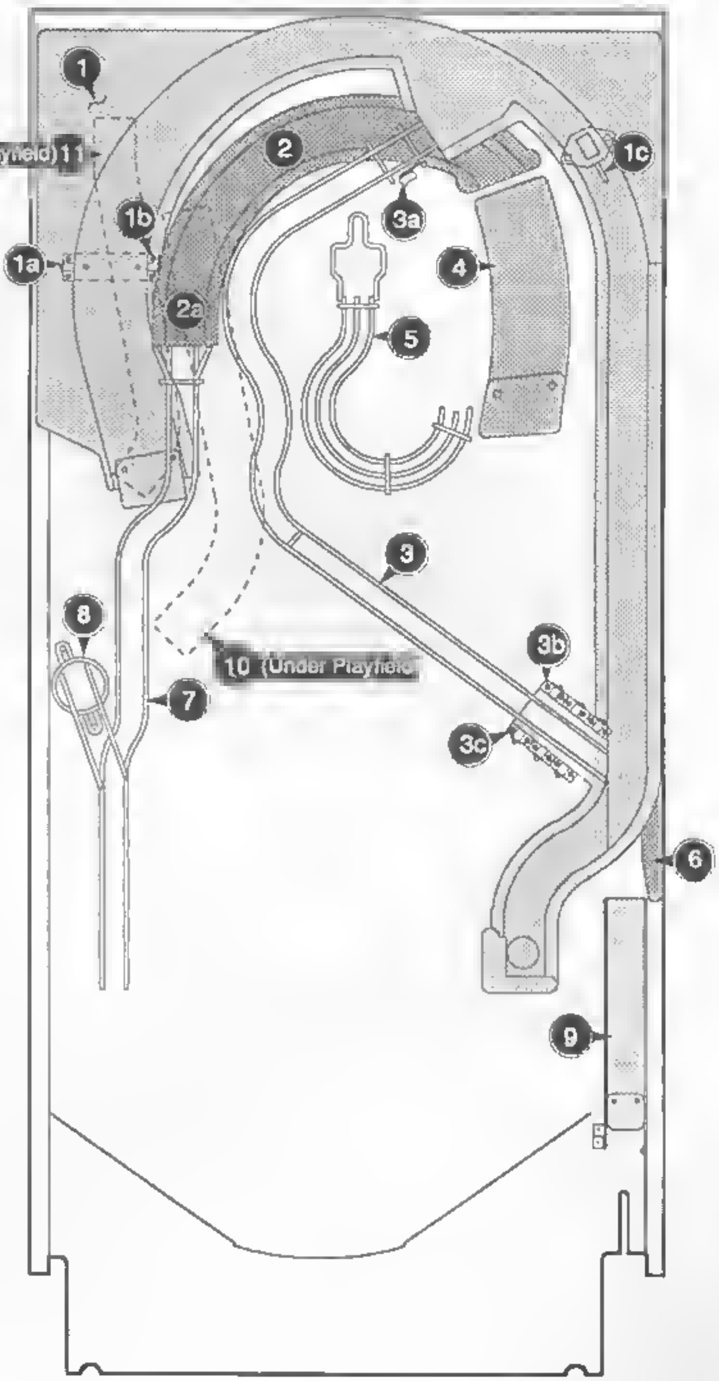
RUBBER PARTS LOCATIONS

Item	Part No.	Qty	Description
A	23-6300	5	5/16" Rubber Ring
B	23-6301	3	3/4" Rubber Ring
C	23-6302	1	1" Rubber Ring
D	23-6304	2	1-1/2" Rubber Ring
E	23-6305	3	2" Rubber Ring
F	23-6306	2	2-1/2" Rubber Ring
G	23-6641-1	6	White Rubber Ring
H	23-6535	2	Rubber Bumper
I	23-6552	3	Yellow Sleeve Bumper
J	23-6556	7	Black Sleeve Bumper
K	23-6327	1	Shooter Tip
L	23-6678-7	2	Flipper Rubber Ring


A
E
D
G
G
G
C
G
E
G
G
B
A
I
J
J
I
A
I
A
J
J
J
A
J
D
E
B
J
H
H
F
F
L
L
K

RAMPS LOCATIONS

Item	Part Number	Description
1.	A-16250	Main Ramp Assembly
a)	A-14316	LED Assembly
b)	A-14315	Photo Transistor Assembly
c)	5647-12693-21	Subminiature Switch
2.	A-16251	Upper Center Ramp Assy.
a)	5647-12693-21	Subminiature Switch
3.	A-16249	Wire Ramp Assembly, Center
a)	5647-12693-21	Subminiature Switch
b)	A-16457-1	3 IR LED PCB Assy. w/ Opto
c)	A-16458-1	3 Opto PCB Assy. w/Opto
4.	A-16270	Center Ramp Assembly
5.	12-7058	Wire Ramp, Coffin
6.	A-16415	Entry Ramp Assembly
7.	12-7056	Wire Ramp, Left
8.	12-7057	Wire Ramp, Ball Popper
9.	A-16247	Entry Ramp Assembly
10.	A-16253	Lwr. Left Ramp Assy.
a)	5647-12693-13	Mini-Micro Switch
11.	A-16252	Lwr. Center Ramp Assy.



Unique Parts List

Part Number	Description	Part Number	Description
A-12738-50001	WPC Sound Board Assembly	A-16268	Disappear Post Assembly
A-12742-50001	WPC CPU Board Assembly	A-16270	Center Ramp Assembly
A-13204-50001	Bottom Arch Assembly	A-16306-1	Flipper Ball Guide Assembly
A-13769-50001	Playfield & Insert Assembly	A-16306-2	Flipper Ball Guide Assembly
A-14376-50001	Backbox Assembly	A-16337-1	3-Lamp Board w/Spacers
A-15646-1	24-Switch Opto Board	A-16366-	Playfield Plastic Set
A-16050	Motor Assembly	A-16367-1	Cashbox Assembly
A-16106-1	3-Lamp Board w/Spacers	A-16397	Coffin & Decals Assembly
A-16107-1	4-Lamp Board w/Spacers	A-16399	Back Panel & Decal Assy.
A-16108-1	4-Lamp Board w/Spacers	A-16415	Entry Ramp Assembly
A-16109-1	5-Lamp Board w/Spacers	A-16417	High Current PCB w/Spacer
A-16110-1	7-Lamp Board w/Spacers	A-16426	Back Panel & Insert Assembly
A-16111-1	5-Lamp Board w/Spacers	A-16441	Bottom Opto Assembly
A-16141	Ball Guide Assembly	A-8552-50001	Backglass Assembly
A-16242	Ball Guide Assembly	02-4176-51	M-F Spacer, 8-32 x 1.72"
A-16144	Ball Guide Assembly	02-4252-66	F-F Spacer, 6-32 x 1.66"
A-16145	Main Ball Guide Assembly	02-4252-67	F-F Spacer, 6-32 x 1.60"
A-16146	Up/Down Post Assembly	02-4252-68	F-F Spacer, 6-32 x 1.72"
A-16152	Ball Deflector Up/Down Assy.	02-4322-20	Post, 8-32 x 3.31"
A-16245	Entry Ramp Mech. Assembly	02-4765-1	Mounting Post
A-16246	Ball Gate Actuator Assembly	03-8860-2	Playfield Mylar
A-16247	Entry Ramp Assembly	03-8860-3	Playfield Mylar
A-16249	Wire Ramp Assy. - Center	03-8860-4	Playfield Mylar
A-16250	Main Ramp Assembly	11-1067-50001	Wood Cabinet
A-16251	Upper-Center Ramp Assy.	12-7055	Wire Ramp, Center
A-16252	Lower-Center Ramp Assy.	12-7056	Wire Ramp, Left
A-16253	Lower Left Ramp Assembly	12-7057	Wire Ball Popper
A-16254	Speaker/Display Assembly	12-7058	Coffin Wire Ramp
A-16256	Wire Ramp Ball Popper Assy.	12-7064	Right Gate Wire
A-16257	Gate & Wire Assembly	12-7065	Left Gate Wire
A-16258	Gate & Wire Assembly	12-7066	Ball Gate Wire
A-16259	Gate & Wire Assembly	31-1002-50001	Screened Playfield
A-16260	Coffin Plate Assembly	31-1008-50001	Screened Bottom Arch
A-16261	Coffin Ball Popper Assembly	31-1009-50001	Screened Shooter Gauge
A-16262	Crypt Ball Popper Assembly	31-1357-50001	Screened Translite
A-16263	Right Ball Popper Assembly	31-1420-50001	Screened Speaker Panel
A-16264	Lift Ramp Assembly	31-1744-	Playfield Plastic Set
A-16265	Up/Down Post Assembly	31-1745-	Decal Set (Top)
A-16266	Coil Magnet & Screw Assy.	31-1746-	Decal Set (Bottom)
A-16267	1-Bank Drop Target Assembly	36-50001	Playfield Hardcoat

Cable List

Part Number	Description	Part Number	Description
H-11835	Knocker Cable	H-16288	General Switch Cable
H-13870	Black Jumper Cable	H-16289	Left Ramp Score
H-14584	Dot Matrix Display	H-16290	Transmitter Cable
H-14790	A.C. Cable	H-16291	Receiver Opto Caable
H-14792-1	A.C. Jumper Cable	H-16292	Castle Opto Cable
H-14792-2	A.C. Jumper Cable	H-16293	24" Receiver Cable
H-15011	Speaker Panel Cable	H-16294	24" Transmitter Cable
H-15476	Logic Power Cable	H-16295	General Lamp Cable
H-15478	Tilt Switch Cable	H-16296	Coffin Lamp Cable
H-15587	Speaker Lamp Cable	H-16297	Magnet Lamp Cable
H-15736	Secondary Cable	H-16299	Gate Coil Cable
H-16125	Playfield Switch Cable	H-16300	Flash Lamp Cable
H-16126	Playfield Lamp Cable	H-16335	Playfield Opto Cable
H-16127	Playfield Solenoid Cable	H-16436	3-Flash Cable
H-16128	Cabinet Cable	H-16437	Mini-Switch Cable
H-16129	Insert Cable		

Section 3

Schematics, Wiring Diagrams, and Circuit Theory

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and position on that board that it connects to. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Sound Board.

Prefix numbers for the WPC circuit boards are listed below.

1- Power Driver Board
2- CPU Board
5- Sound Board
6- Dot Matrix Controller
  Dot Matrix Display/Driver Board
9-Fliptronic II Controller Board

Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet and all other backbox board schematics are found in this section.

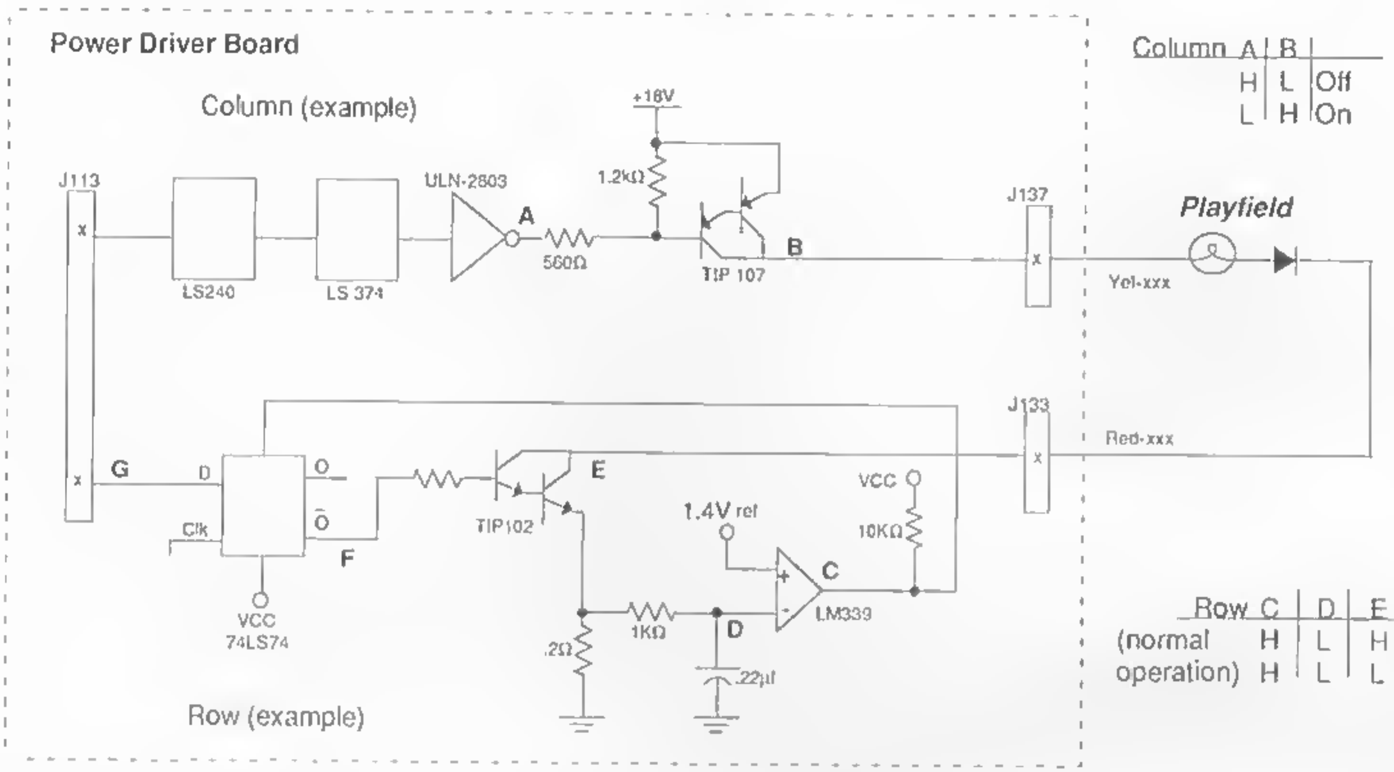
LAMPS

Lamp Matrix

Red
Yellow (B+)

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
1 Red-Brown J133-1 Q90	Not Used 11	Coffin Lock 1 21	R. Lane: Video "V" 31	Right Return 41	Coffin Lamp 1 51	Left Skill 100K 61	Dracula "C" 71	Rats Mode 81
2 Red-Black J133-2 Q89	Not Used 12	Coffin Lock 2 22	R. Lane: Video "I" 32	Right Drain 42	Coffin Lamp 2 52	M. Skill 1 Million 62	Dracula "L" 72	Dracula "A" 82
3 Red-Orange J133-4 Q88	Not Used 13	Dracula "A" 23	R. Lane: Video "D" 33	Coffin Multiball 43	Magnet 53	R. Skill 100K 63	Left 3-bank Top 73	T.L. Hole: Mystery 83
4 Red-Yellow J133-5 Q87	Not Used 14	R. Ramp: 0.5 Million 24	R. Lane: Video "E" 34	Playfield 2X 44	Shoot Again 54	Top 3-lane Left 64	Left 3-bank Middle 74	T.L. Hole: Carriage 84
5 Red-Green J133-6 Q86	Not Used 15	R. Ramp: 1 Million 25	R. Lane: Video "O" 35	Castle Multiball 45	Love Never Dies 55	Top 3-lane Middle 65	Left 3-bank Bottom 75	T.L. Hole: Ex-ball 85
6 Red-Blue J133-7 Q85	R. Ramp Lock 16	R. Ramp: 2.5 Million 26	Dracula "R" 36	Playfield 3X 46	Coffin Lamp 3 56	Top 3-lane Right 66	Middle 3-bank Left 76	T.L. Hole: Jackpot 86
7 Red-Violet J133-8 Q84	Dracula Face 17	R. Ramp: Double 27	Left Drain 37	Mist Multiball 47	L. Ramp Lock 57	Dracula "U" 67	Middle 3-bank Middle 77	Launch Ball 87
8 Red-Gray J133-9 Q83	R. Ramp: 2 Million 18	R. Ramp: 1.5 Million 28	Left Return 38	Dracula "D" 48	L. Ramp Diverted 58	Jet Insert 68	Middle 3-bank Right 78	Game Start 88

Lamp Matrix Circuit


Power Driver Board
Column (example)
+18V
J113
1.2kΩ
ULN-2803
A
560Ω
TIP 107
B
J137
LS240
LS 374
Playfield
Yel-xxx
J133
Red-xxx
G
D
Clk
O
Ō
F
TIP102
E
1.4V ref
VCC
10KΩ
C
LM339
1KΩ
D
.2Ω
.22µf
VCC
74LS74
Row (example)

Column	A	B	
	H	L	Off
	L	H	On

Row	C	D	E	F	G	
(normal	H	L	H	L	H	Off
operation)	H	L	L	H	L	On

The processor sends a signal to the column circuit causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of TIP102 causes the transistor to conduct bringing the row circuit to ground and turning the lamp On.

The processor changes the input of the 74LS74 to a high state to turn the lamp Off.

In overcurrent conditions the lamp is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

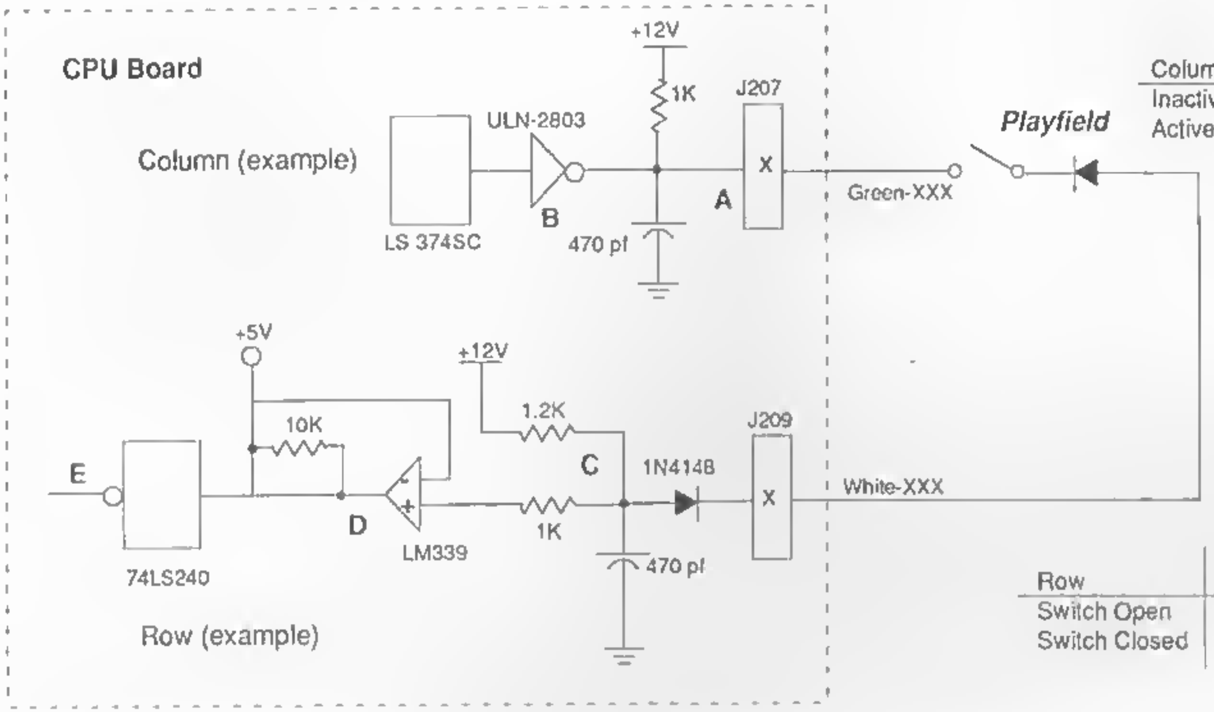
SWITCHES

Switch Matrix

White
Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	Not Used 11	Slam Tilt 21	Under Shooter Ramp 31	Trough 1 Ball 41	Opto T.R. Lane 51	Left Jet 61	Opto Castle Popper 71	Magnet Left 81	Black-Green J906-1 Lower Right E.O.S. Switch F1
Orange-Red J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	Not Used 12	Coin Door Closed 22	Not Used 32	Trough 2 Balls 42	Opto Magnet L. Pocket 52	Right Jet 62	Opto Coffin Popper 72	Ball On Magnet 82	Blue-Violet J905-1 Lower Right Flipper Button F2
Orange-Black J205-3 Right Coin Chute D3	3 White-Orange J209-3 U18-5	Start Button 13	Ticket Opto. 23	Not Used 33	Trough 3 Balls 43	Opto Castle 1 53	Bottom Jet 63	Opto L. Ramp Entry 73	Magnet Right 83	Black-Blue J906-3 Lower Left E.O.S. Switch F3
Orange-Yellow J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Launch Ball 34	Trough 4 Balls 44	Opto Castle 2 54	Left Sling 64	Not Used 74	L. Ramp Score 84	Blue-Grey J905-2 Lower Left Flipper Button F4
Orange-Green J205-6 Normal Function: Service Credits Test Function: Escape D5	5 White-Green J209-5 U19-11	L. Drop Target 15	Top 3-lane Left 25	Left Drain 35	Not Used 45	Opto Wire Ramp Popper 55	Right Sling 65	Not Used 75	L. Ramp Diverted 85	Black-Violet J906-4 Upper Right E.O.S. Switch F5
Orange-Blue J205-7 Normal Function: Volume Down Test Function: Down D6	6 White-Blue J209-7 U19-9	L. Drop Score 16	Top 3-Lane Middle 26	Left Return 36	Not Used 46	Opto Crypt Popper 56	Left 3-bank Top 66	Not Used 76	Middle 3-bank Left 86	Black-Yellow J905-3 Upper Right Flipper Button F6
Orange-Violet J205-8 Normal Function: Volume Up Test Function: Up D7	7 White-Violet J209-8 U19-5	Shooter Lane 17	Top 3-lane Right 27	Right Return 37	Not Used 47	Opto Castle 3 57	Left 3-bank Middle 67	R. Ramp Up 77	Middle 3-bank Middle 87	Black-Grey J906-5 Upper Left E.O.S. Switch F7
Orange-Grey J205-9 Normal Function: Begin Test Test Function: Enter D8	8 White-Grey J209-9 U19-7	Not Used 18	R. Ramp Score 28	Right Drain 38	Outhole 48	Mystery Hole 58	Left 3-Bank Bottom 68	Not Used 78	Middle 3-bank Right 88	Black-Blue J905-5 Upper Left Flipper Button F8

Switch Matrix Circuit


CPU Board
Column (example)
LS 374SC
ULN-2803
B
+12V
1K
470 pf
A
J207
x
Green-XXX
Playfield
Row (example)
E
74LS240
+5V
10K
D
LM339
+12V
1.2K
1K
C
1N4148
470 pf
J209
x
White-XXX

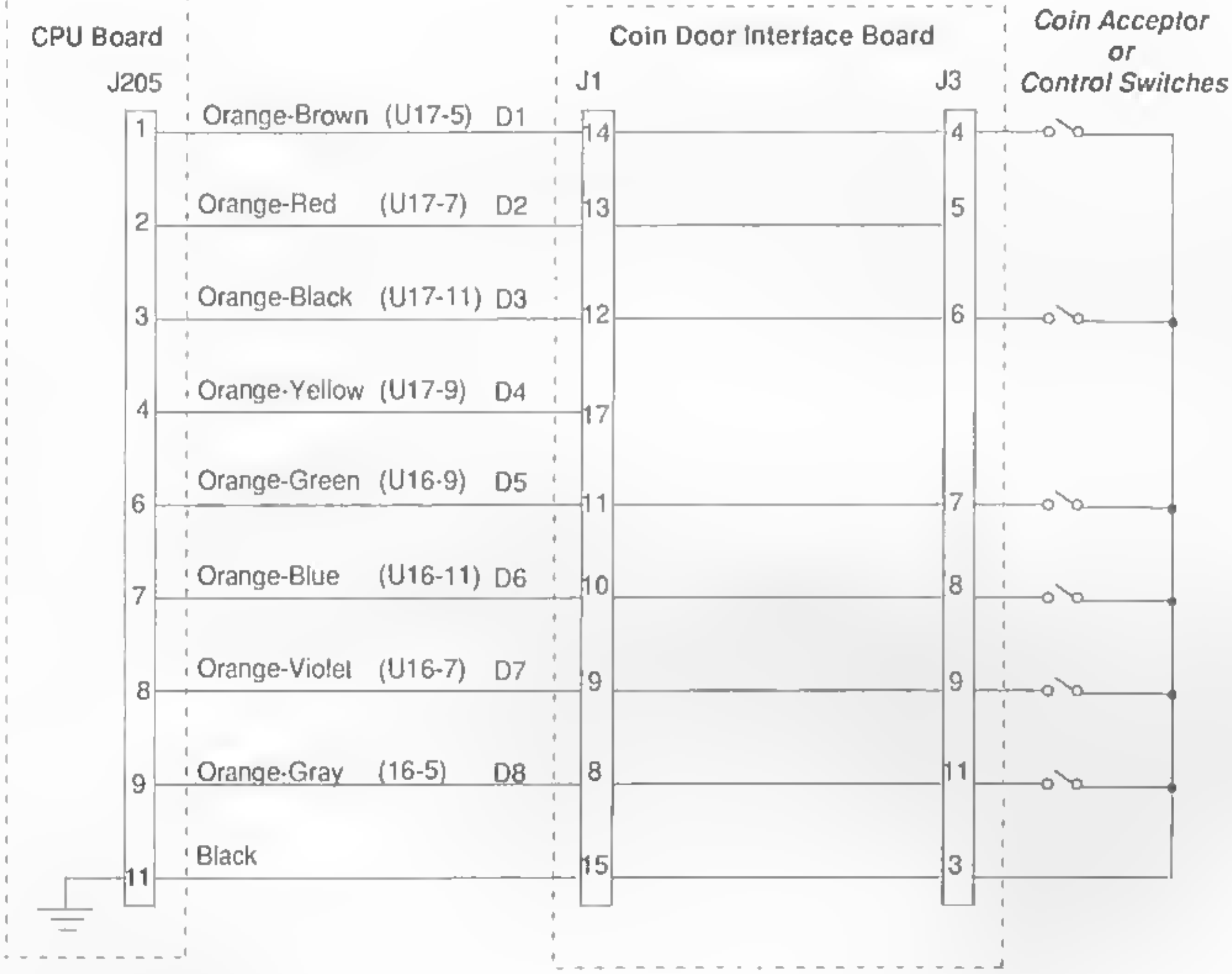
Column	A	B	
Inactive	H	L	Off
Active	L	H	On

Row	C	D	E	
Switch Open	H	H	L	Off
Switch Closed	L	L	H	On

The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low the column side is active.

When a switch closes the row side of the circuit activates. The "+" input to the LM339 drops below +5V therefore its output is low. Corresponding row and column switches must be low at the same time, for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

Dedicated Switches


CPU Board
J205
1
2
3
4
6
7
8
9
11
Orange-Brown (U17-5) D1
Orange-Red (U17-7) D2
Orange-Black (U17-11) D3
Orange-Yellow (U17-9) D4
Orange-Green (U16-9) D5
Orange-Blue (U16-11) D6
Orange-Violet (U16-7) D7
Orange-Gray (16-5) D8
Black
Coin Door Interface Board
J1
14
13
12
17
11
10
9
8
15
J3
4
5
6
7
8
9
11
3
Coin Acceptor or Control Switches

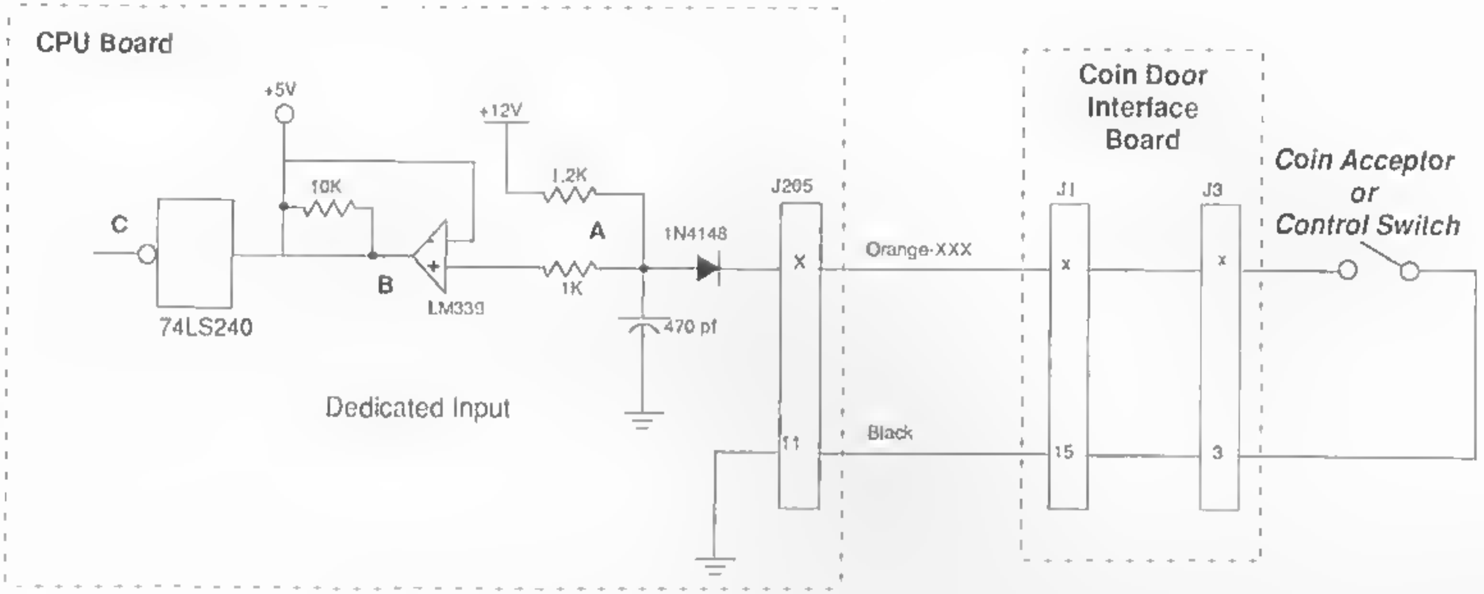
Coin Acceptor Switches

D1 Left Coin Chute
D2 Center Coin Chute
D3 Right Coin Chute
D4 Forth Coin Chute

Control Switches

D5 Normal Function: Service Credits
Test Function: Escape
D6 Normal Function: Volume Down
Test Function: Down
D7 Normal Function: Volume Up
Test Function: Up
D8 Normal Function: Begin Test
Test Function: Enter

Dedicated Switch Circuit


CPU Board
+5V
+12V
10K
1.2K
C
A
B
1N4148
J205
74LS240
LM339
1K
470 pf
Dedicated Input
x
11
Orange-XXX
Black
Coin Door
Interface
Board
J1
J3
x
15
x
3
Coin Acceptor
or
Control Switch

Switch	A	B	C	
Open	H	H	L	Off
Closed	L	L	H	On

The dedicated switches operate similar to switches in the matrix except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

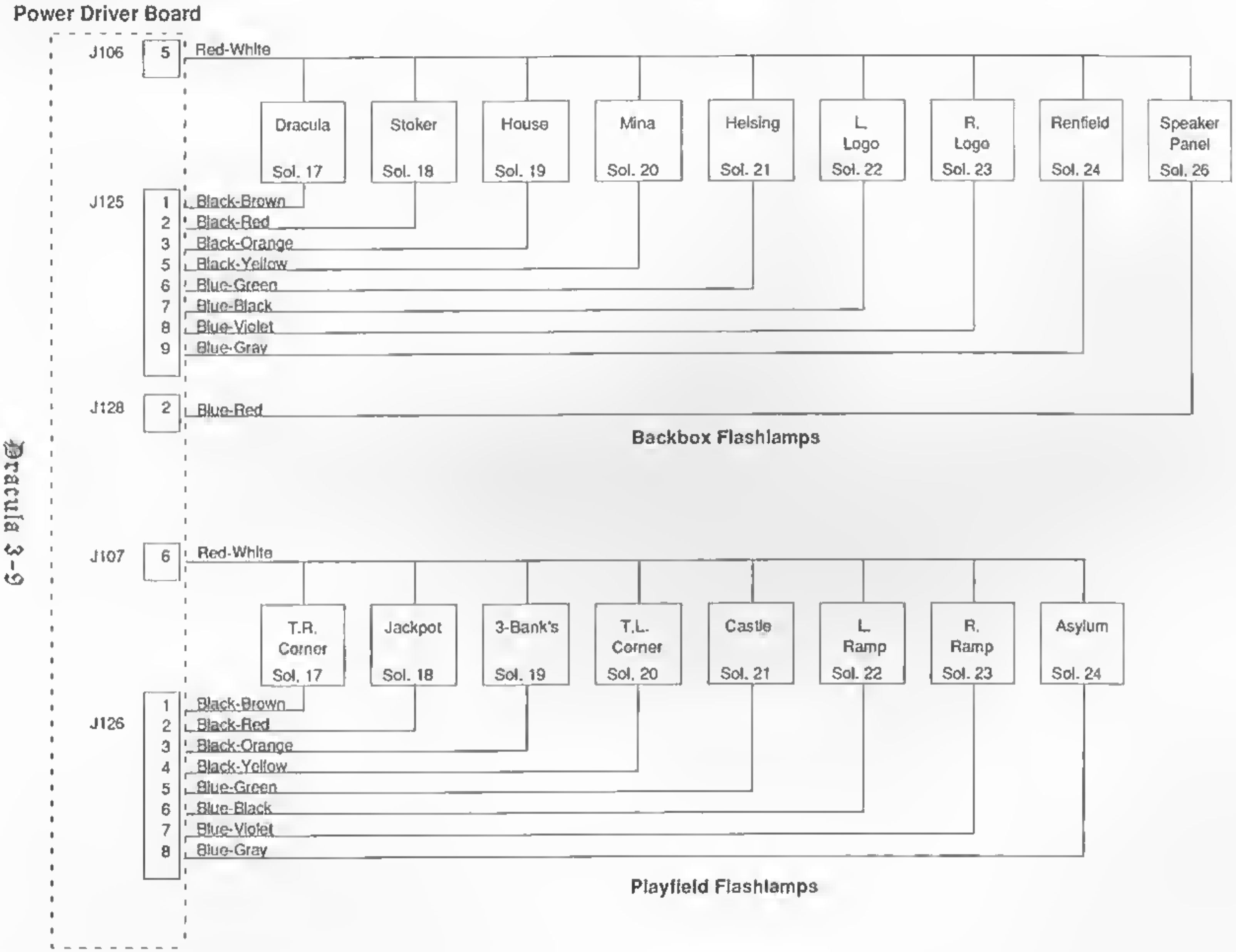
When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V therefore its output is low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

SOLENOID / FLASHER TABLE

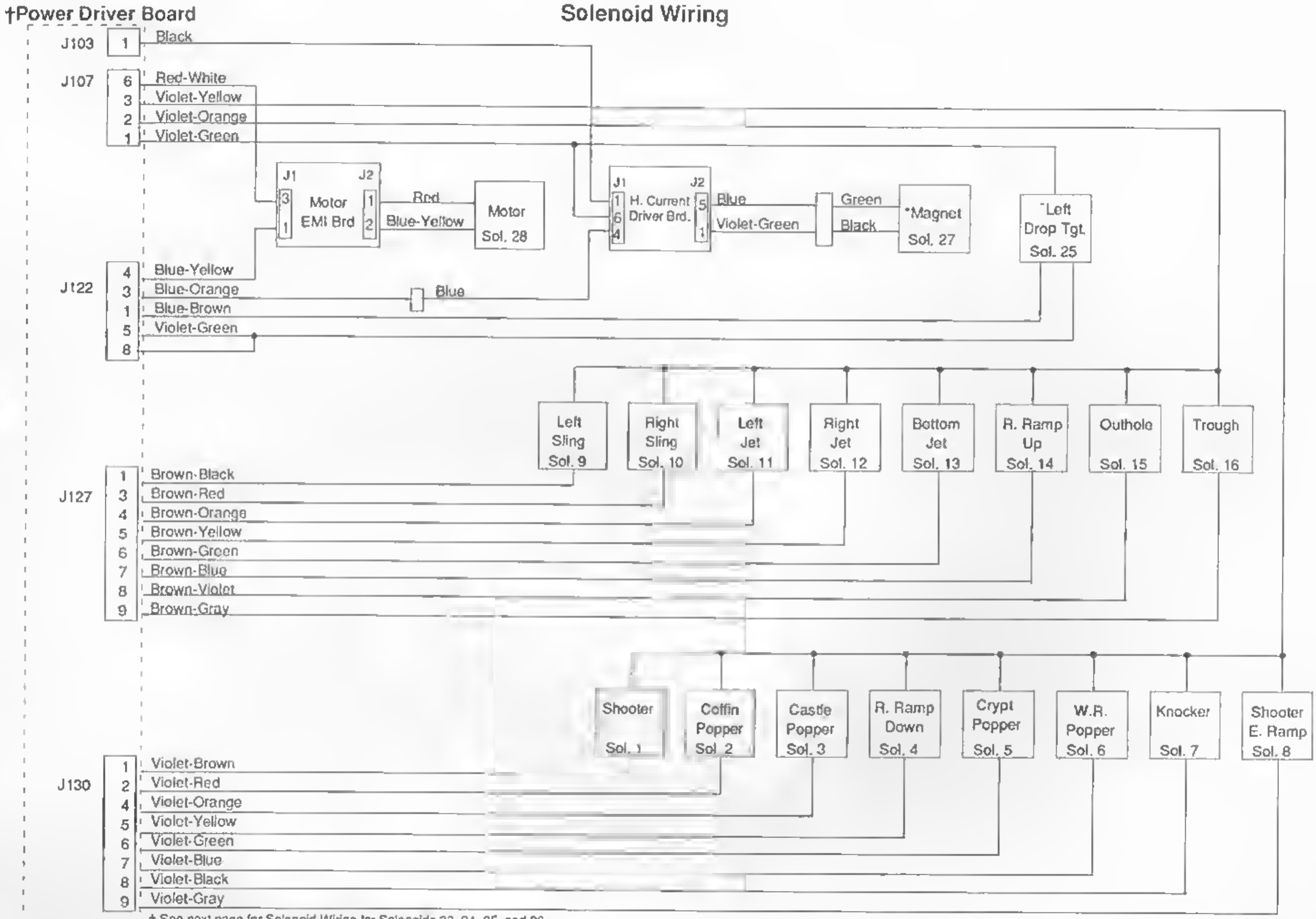
Sol. No.	Function	Solenoid Type	Voltage Connections			Drive xistor	Drive Connections			Drive Wire Color	Solenoid Part Number Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	Shooter	High Power	J107-3			Q82	J130-1			Vio-Brn	AE-23-800	
02	Coffin Popper	High Power	J107-3			Q80	J130-2			Vio-Red	AE-24-900	
03	Castle Popper	High Power	J107-3			Q78	J130-4			Vio-Org	AE-26-1500	
04	Right Ramp Down	High Power	J107-3			Q76	J130-5			Vio-Yel	AE-26-1200	
05	Crypt Popper	High Power	J107-3			Q64	J130-6			Vio-Grn	AE-26-1500	
06	Wire Ramp Ball Popper	High Power	J107-3			Q66	J130-7			Vio-Blu	AE-23-800	
07	Knocker	High Power	J107-3			Q68	J130-8			Vio-Blk	AE-23-800	
08	Shooter Ramp Entry	High Power	J107-3			Q70	J130-9			Vio-Gry	AE-26-1500	
09	Left Sling	Low Power	J107-2			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Right Sling	Low Power	J107-2			Q56	J127-3			Brn-Red	AE-26-1200	
11	Left Jet	Low Power	J107-2			Q54	J127-4			Brn-Org	AE-26-1200	
12	Right Jet	Low Power	J107-2			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Bottom Jet	Low Power	J107-2			Q50	J127-6			Brn-Grn	AE-26-1200	
14	Right Ramp Up	Low Power	J107-2			Q48	J127-7			Brn-Blu	SM1-28-900	
15	Outhole	Low Power	J107-2			Q46	J127-8			Brn-Vio	AE-27-1200	
16	Trough	Low Power	J107-2			Q44	J127-9			Brn-Gry	AE-26-1200	
17	T.R Corner / Dracula FL	Flasher	J107-6	J106-5		Q42	J126-1	J125-1		Blk-Brn	(3) #906	(1) #906
18	Jackpot / Stoker FL	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	(1) #906	(1) #906
19	3-bank / House FL	Flasher	J107-6	J106-5		Q38	J126-3	J125-3		Blk-Org	(1) #89	(1) #906
20	T.L. Corner / Mina FL	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	(1)#89,(1)#906	(1) #906
21	Castle / Helsing FL	Flasher	J107-6	J106-5		Q28	J126-5	J125-6		Blu-Grn	(2) #89	(1) #906
22	L. Ramp / L. Logo FL	Flasher	J107-6	J106-5		Q30	J126-6	J125-7		Blu-Blk	(1) #906	(1) #906
23	R. Ramp / R. Logo FL	Flasher	J107-6	J106-5		Q34	J126-7	J125-8		Blu-Vio	(1) #906	(1) #906
24	Asylum / Renfield FL	Flasher	J107-6	J106-5		Q32	J126-8	J125-9		Blu-Gry	(1) #89	(1) #906
25	L. Drop Target	Low Power	J107-1			Q26	*J122-1			Blu-Brn	AE-26-1200	
26	Speaker Panel FL	Low Power		J106-5		Q24		J128-2		Blu-Red		(3) #906
27	Magnet	Low Power	J107-1			Q22	*J122-3			Blu-Org	20-9831	
28	Magnet's Motor	Low Power	J107-6			Q20	J122-4			Blu-Yel	14-7981	
	General Illumination		Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	Lower Playfield / Insert	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#555	#555
02	Upper Playfield / Insert	G.I.	J121-2	J120-2		Q10	J121-8	J120-8		Wht-Org	#555	#555
03	Center Playfield / Insert	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#555	#555
04	Insert	G.I.		J120-5		Q16		J120-10		Wht-Grn	#555	#555
05	Insert	G.I.		J120-6	J119-3	Q12		J120-11	J119-1	Wht-Vio	#555	#555
	Flipper Circuits		Playfield		Power	Hold	Playfield		Power	Hold		
	Lower Left Flipper	Flipper	J907-6,7 (Gry-Yel)		Q3	Q9	J902-7,9		Blu-Gry	Org-Blu	FL-15411	
	Lower Right Flipper	Flipper	J907-8,9 (Blu-Yel)		Q4	Q11	J902-11,13		Blu-Vio	Org-Grn	FL-15411	
33	Up/Down Post Diverter	Up Lt. F. Power	J907-2		Q1		J902-3		Blk-Blu		AE-26-1500	
34	Right Gate	Up Lt. F. Hold	J907-1			Q5	J902-1			Org-Gry	AE-26-1500	
35	Dis. Castle Release Pst	Up Rt. F. Power	J907-5		Q2		J902-6		Blk-Yel		AE-26-1500	
36	Left Ball Gate Actuator	Up Rt. F. Hold	J907-4			Q7	J902-4			Org-Vio	A-14406	

* J122-1, 3 have flyback diodes at J122-5, 8 respectively.

Flashlamp Wiring


Power Driver Board
J106
5
Red-White
Dracula
Sol. 17
Stoker
Sol. 18
House
Sol. 19
Mina
Sol. 20
Helsing
Sol. 21
L.
Logo
Sol. 22
R.
Logo
Sol. 23
Renfield
Sol. 24
Speaker
Panel
Sol. 26
J125
1 Black-Brown
2 Black-Red
3 Black-Orange
5 Black-Yellow
6 Blue-Green
7 Blue-Black
8 Blue-Violet
9 Blue-Gray
J128
2 Blue-Red
Backbox Flashlamps
J107
6
Red-White
T.R.
Corner
Sol. 17
Jackpot
Sol. 18
3-Bank's
Sol. 19
T.L.
Corner
Sol. 20
Castle
Sol. 21
L.
Ramp
Sol. 22
R.
Ramp
Sol. 23
Asylum
Sol. 24
J126
1 Black-Brown
2 Black-Red
3 Black-Orange
4 Black-Yellow
5 Blue-Green
6 Blue-Black
7 Blue-Violet
8 Blue-Gray
Playfield Flashlamps

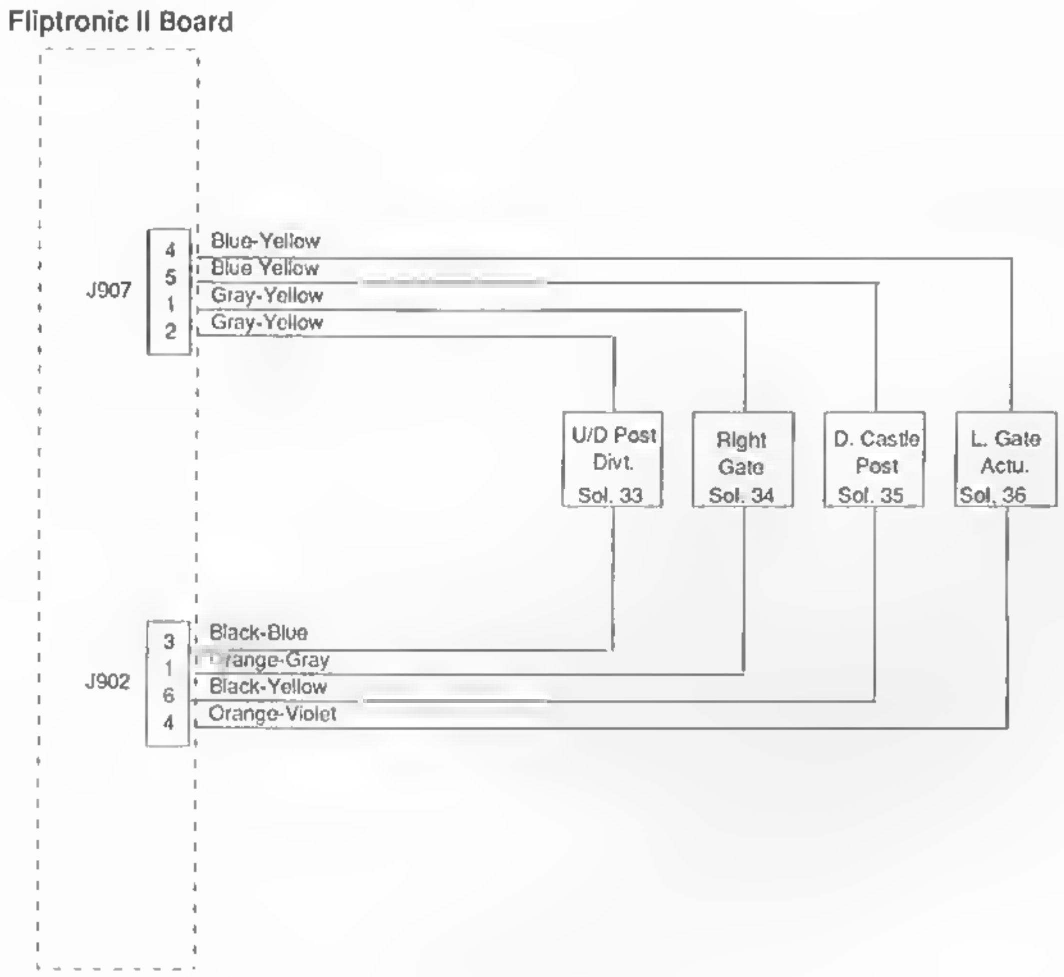
Solenoid Wiring


†Power Driver Board
J103
1
Black
J107
6
Red-White
3
Violet-Yellow
2
Violet-Orange
1
Violet-Green
J122
4
Blue-Yellow
3
Blue-Orange
1
Blue-Brown
5
Violet-Green
8
J127
1
Brown-Black
3
Brown-Red
4
Brown-Orange
5
Brown-Yellow
6
Brown-Green
7
Brown-Blue
8
Brown-Violet
9
Brown-Gray
J130
1
Violet-Brown
2
Violet-Red
4
Violet-Orange
5
Violet-Yellow
6
Violet-Green
7
Violet-Blue
8
Violet-Black
9
Violet-Gray
J1
J2
Motor EMI Brd
Red
Blue-Yellow
Motor Sol. 28
Blue
H. Current Driver Brd.
Blue
Violet-Green
Green
Black
*Magnet Sol. 27
*Left Drop Tgt. Sol. 25
Left Sling Sol. 9
Right Sling Sol. 10
Left Jet Sol. 11
Right Jet Sol. 12
Bottom Jet Sol. 13
R. Ramp Up Sol. 14
Outhole Sol. 15
Trough Sol. 16
Shooter Sol. 1
Coffin Popper Sol. 2
Castle Popper Sol. 3
R. Ramp Down Sol. 4
Crypt Popper Sol. 5
W.R. Popper Sol. 6
Knocker Sol. 7
Shooter E. Ramp Sol. 8

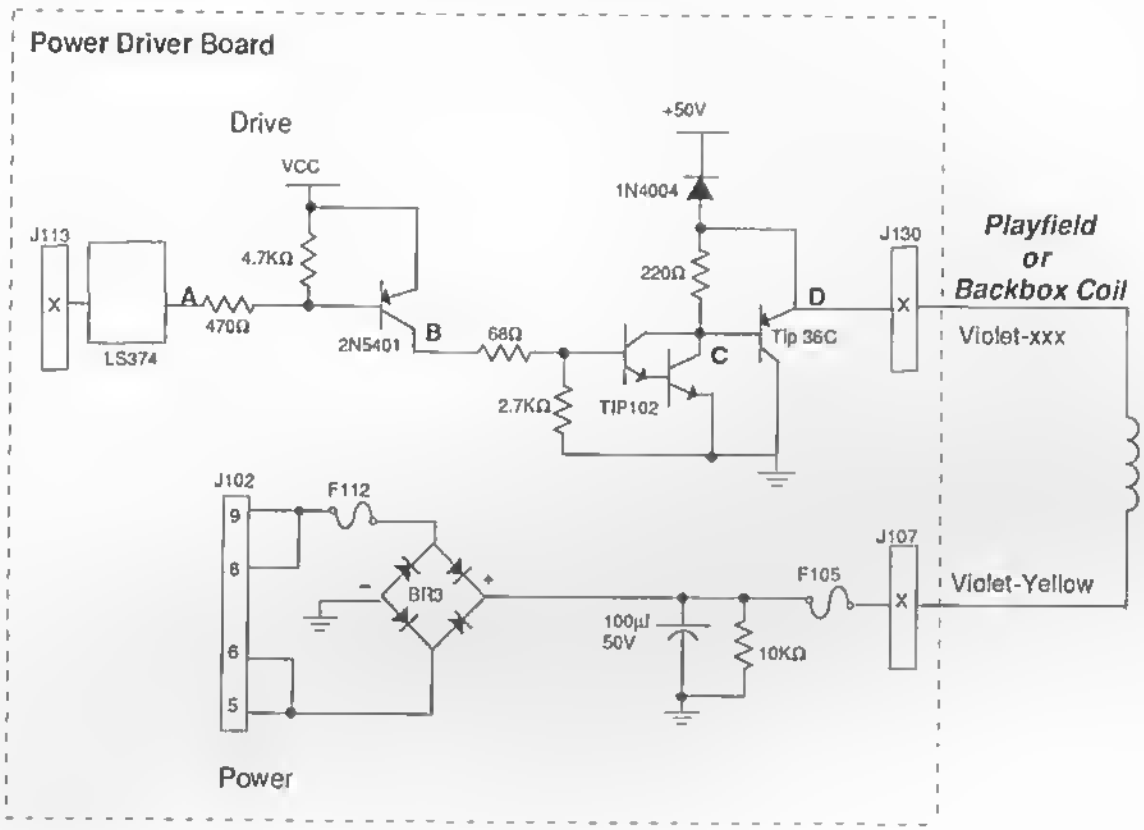
† See next page for Solenoid Wiring for Solenoids 33, 34, 35, and 36.

* Solenoids 25 and 27 have tieback diodes.

Solenoid Wiring Continued...

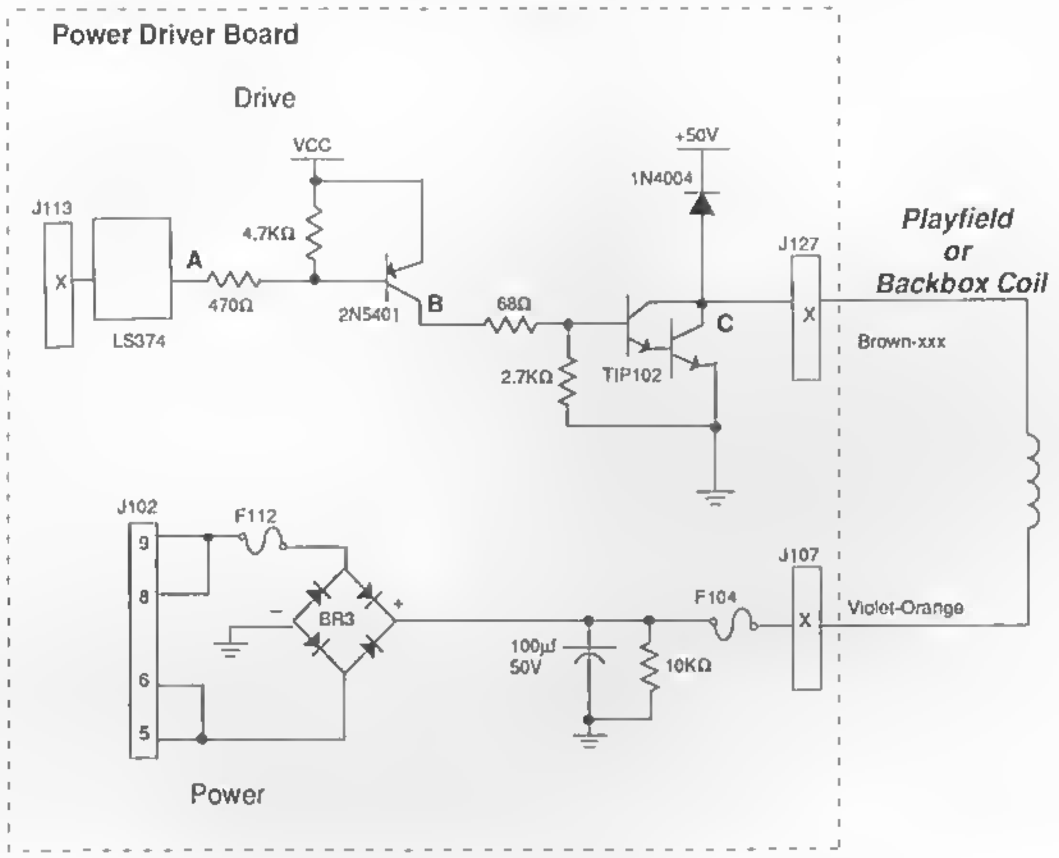

Fliptronic II Board
J907
4
5
1
2
Blue-Yellow
Blue Yellow
Gray-Yellow
Gray-Yellow
J902
3
1
6
4
Black-Blue
Orange-Gray
Black-Yellow
Orange-Violet
U/D Post Divt. Sol. 33
Right Gate Sol. 34
D. Castle Post Sol. 35
L. Gate Actu. Sol. 36

High Power Solenoid Circuit


Power Driver Board
Drive
VCC
J113
X
LS374
A
470Ω
4.7KΩ
2N5401
B
68Ω
2.7KΩ
TIP102
C
+50V
1N4004
220Ω
D
Tip 36C
J130
X
Playfield
or
Backbox Coil
Violet-xxx
J102
9
8
6
5
F112
BR3
-
+
100µf
50V
10KΩ
F105
J107
X
Violet-Yellow
Power

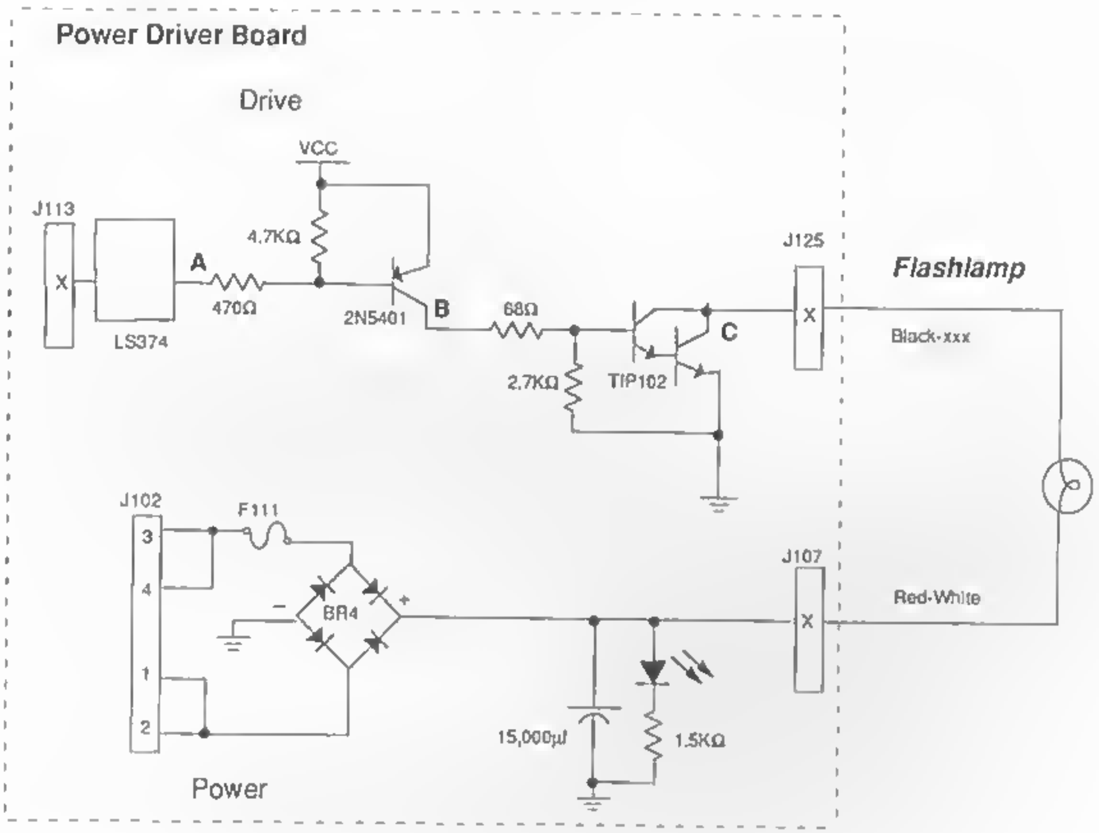
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

Low Power Solenoid Circuit


Power Driver Board
Drive
VCC
J113
X
LS374
A
470Ω
4.7KΩ
2N5401
B
68Ω
2.7KΩ
TIP102
C
+50V
1N4004
J127
X
Playfield
or
Backbox Coil
Brown-xxx
J102
9
8
6
5
F112
BR3
-
+
100µf
50V
10KΩ
F104
J107
X
Violet-Orange
Power

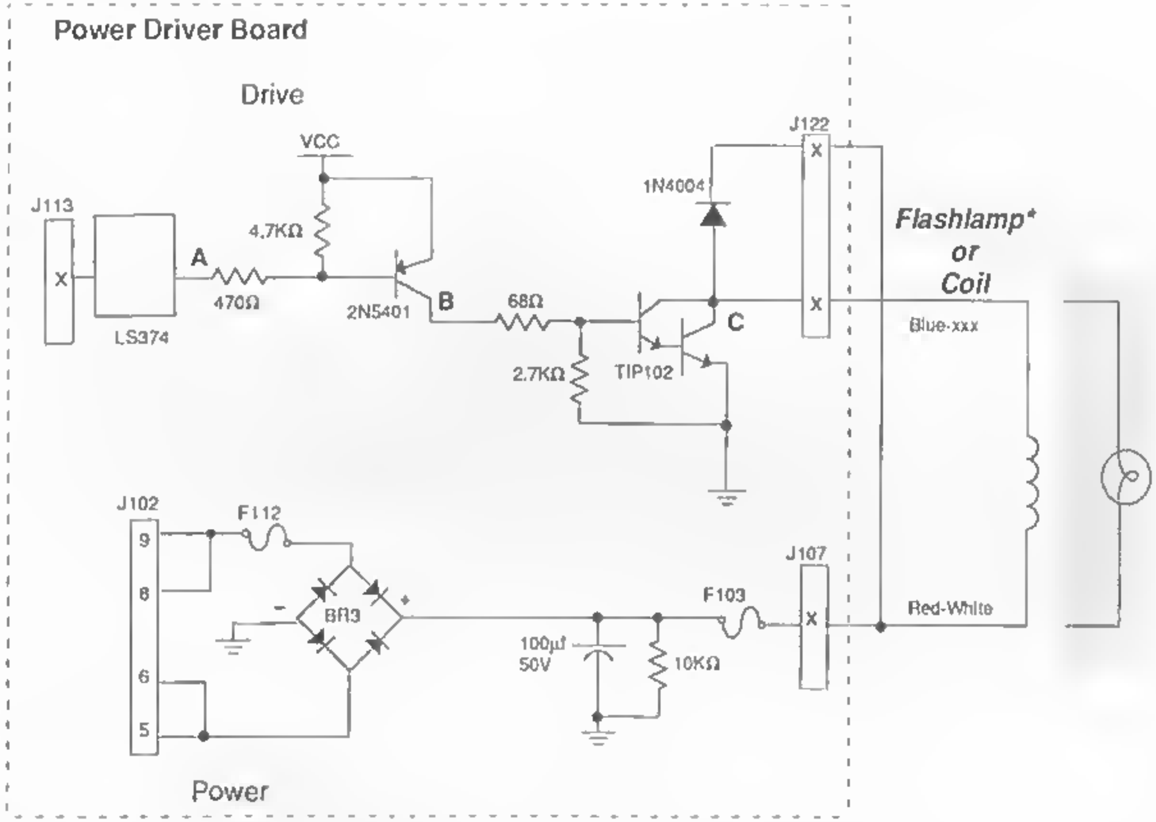
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

Flashlamp Circuit


Power Driver Board
Drive
VCC
J113
X
LS374
A
470Ω
4.7KΩ
2N5401
B
68Ω
2.7KΩ
TIP102
C
J125
X
Flashlamp
Black-xxx
J102
3
4
1
2
F111
BR4
-
+
15,000μf
1.5KΩ
J107
X
Red-White
Power

The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When Point "C" is low the flashlamp is grounded through the transistor and the flashlamp turns On. When point "A" toggles high the circuit shuts Off.

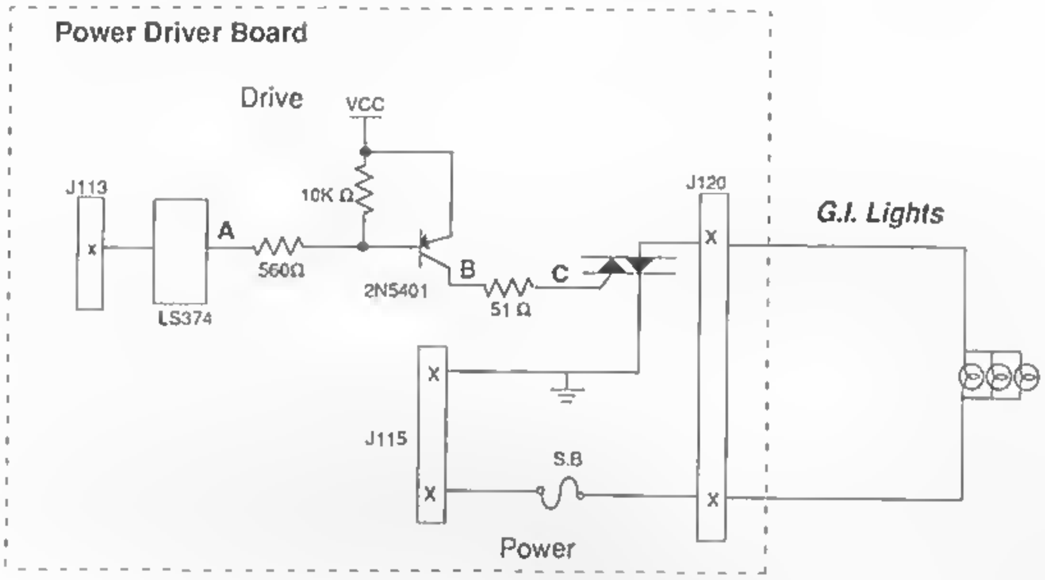
Special (General Purpose) Solenoid Circuit


Power Driver Board
Drive
VCC
J113
x
LS374
A
470Ω
4.7KΩ
2N5401
B
68Ω
2.7KΩ
TIP102
C
1N4004
J122
x
x
Flashlamp*
or
Coil
Blue-xxx
Red-White
J102
9
8
6
5
F112
BR3
-
+
100μf
50V
10KΩ
F103
J107
x
Power

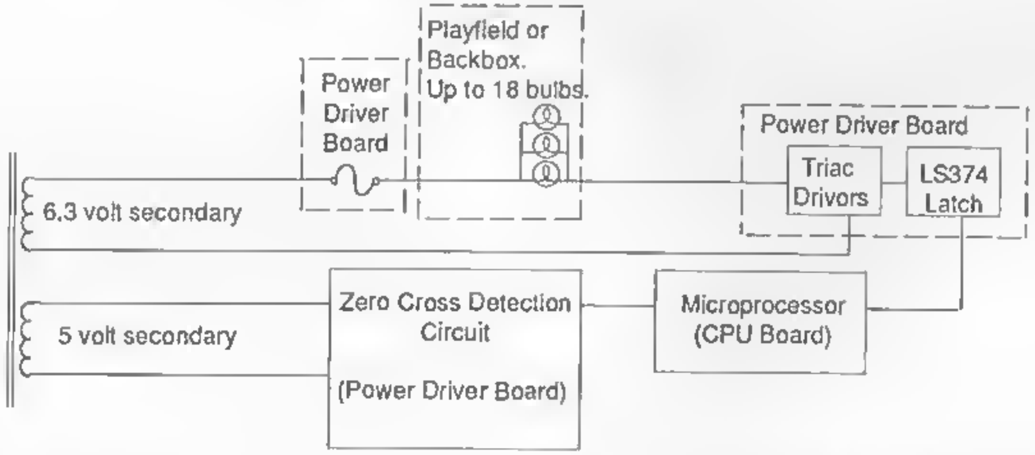
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp turns Off.

* Tieback Diode is not used for flashlamp circuit.

General Illumination Circuit

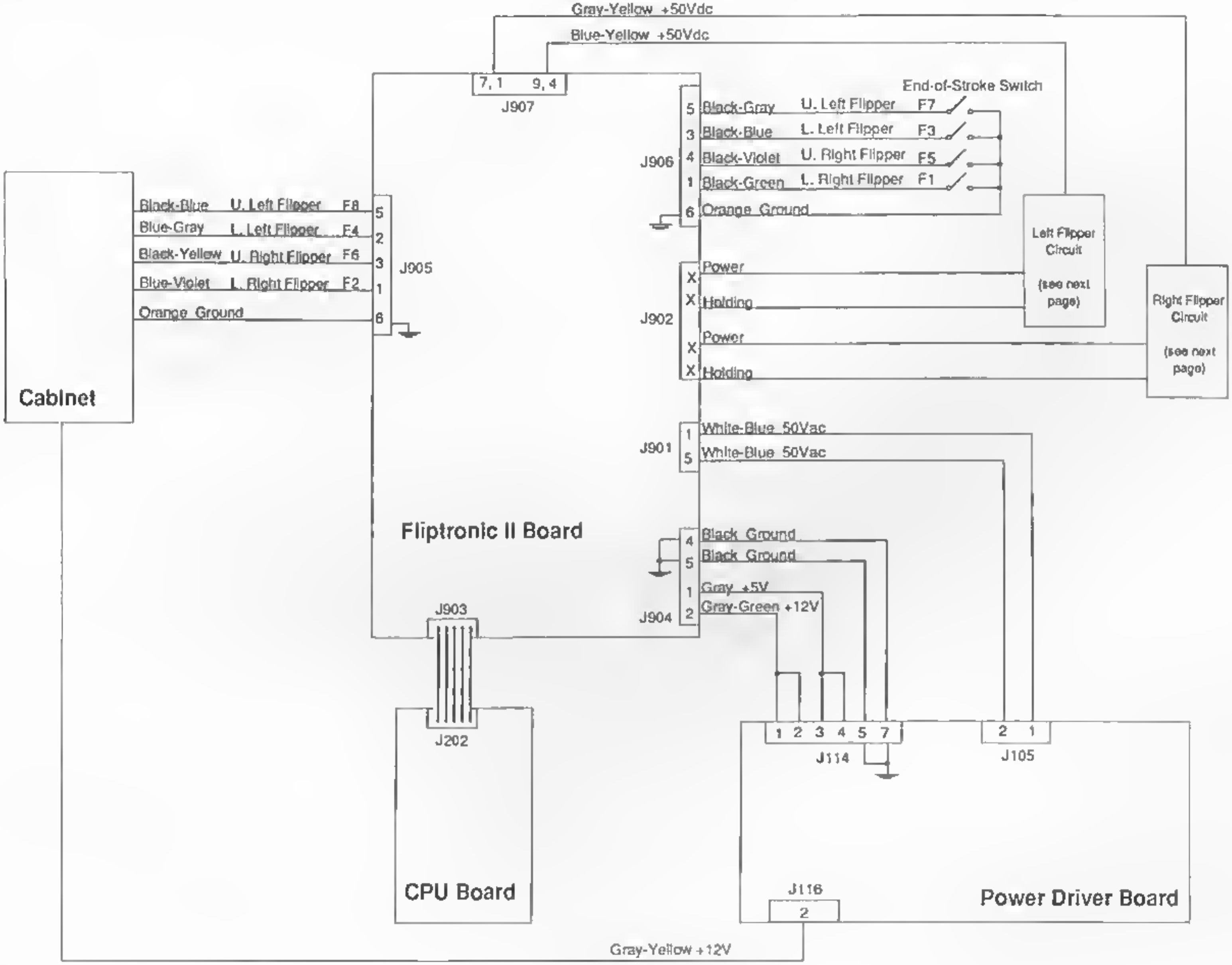

Power Driver Board
Drive
VCC
J113
x
LS374
A
560Ω
10K Ω
2N5401
B
51 Ω
C
J120
x
x
J115
x
x
S.B
Power
G.I. Lights

Block Diagram of General Illumination Circuit


6.3 volt secondary
5 volt secondary
Power Driver Board
Playfield or Backbox. Up to 18 bulbs.
Power Driver Board
Triac Drivors
LS374 Latch
Zero Cross Detection Circuit
(Power Driver Board)
Microprocessor (CPU Board)

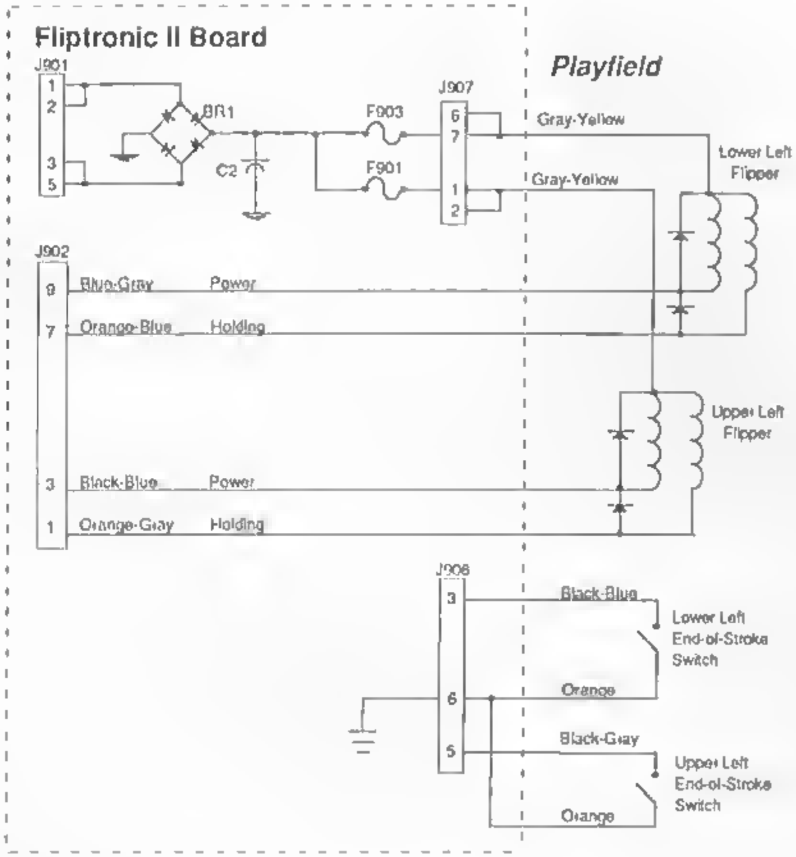
When point “A” toggles low, then points “B” and “C” are high. This turns On the triac and the desired General Illumination string lights.

Fliptronic II Flipper Circuit Diagram

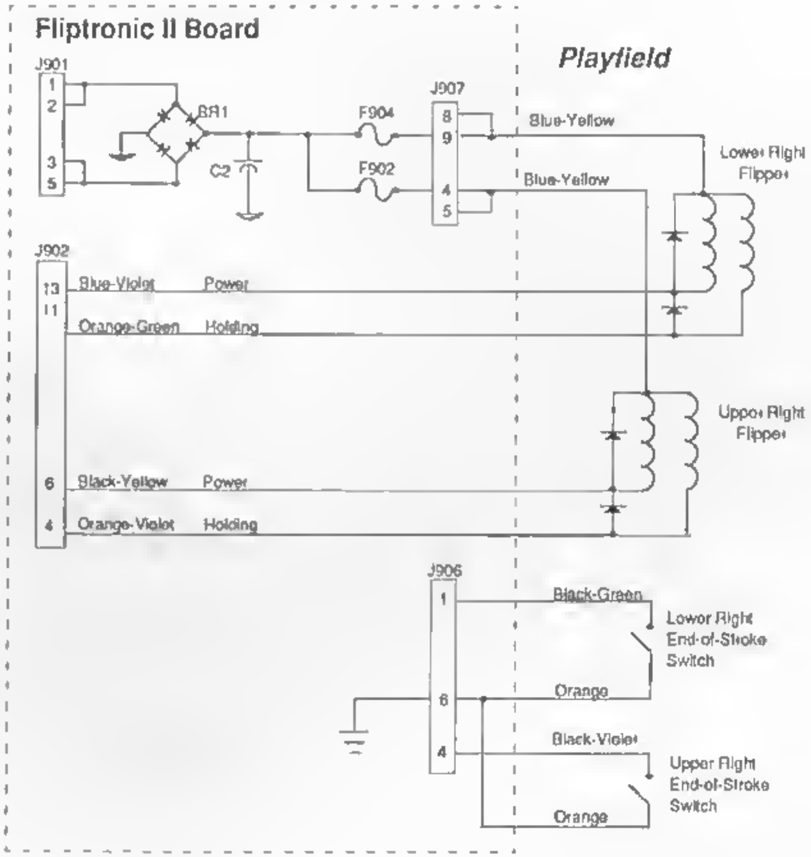

Gray-Yellow +50Vdc
Blue-Yellow +50Vdc
7, 1
9, 4
J907
End-of-Stroke Switch
5 Black-Gray U. Left Flipper F7
3 Black-Blue L. Left Flipper F3
4 Black-Violet U. Right Flipper F5
1 Black-Green L. Right Flipper F1
6 Orange Ground
J906
Left Flipper Circuit (see next page)
Right Flipper Circuit (see next page)
X Power
X Holding
X Power
X Holding
J902
1 White-Blue 50Vac
5 White-Blue 50Vac
J901
4 Black Ground
5 Black Ground
1 Gray +5V
2 Gray-Green +12V
J904
Cabinet
Black-Blue U. Left Flipper F8 5
Blue-Gray L. Left Flipper F4 2
Black-Yellow U. Right Flipper F6 3
Blue-Violet L. Right Flipper F2 1
Orange Ground 6
J905
Fliptronic II Board
J903
J202
CPU Board
1 2 3 4 5 7
J114
2 1
J105
J116
2
Power Driver Board
Gray-Yellow +12V

Fliptronic II Flipper Circuits

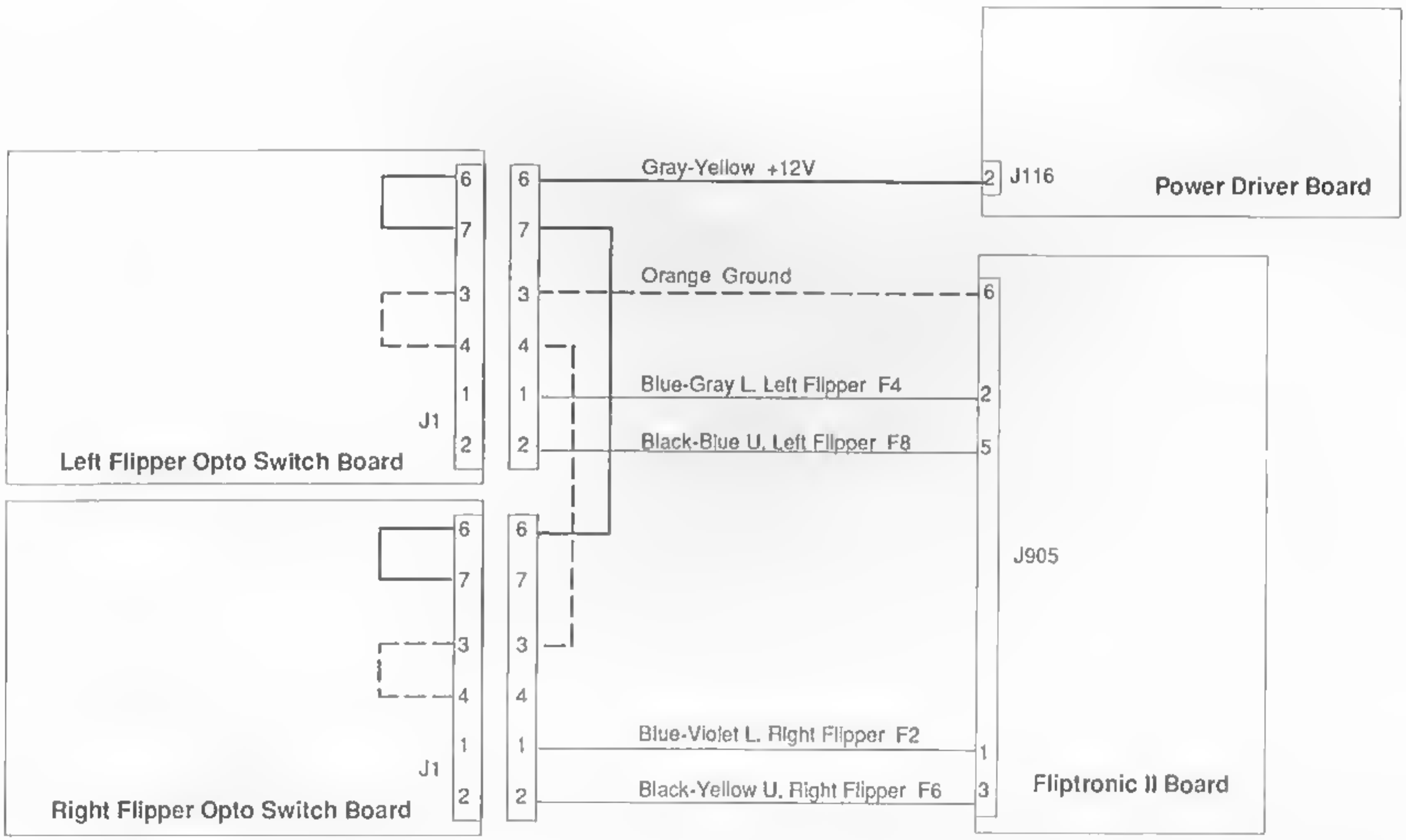
Left Flipper Circuit


Fliptronic II Board
Playfield
J901
1
2
3
5
BR1
C2
F903
F901
J907
6
7
1
2
Gray-Yellow
Gray-Yellow
Lower Left Flipper
J902
9
Blue-Gray
Power
7
Orange-Blue
Holding
Upper Left Flipper
3
Black-Blue
Power
1
Orange-Gray
Holding
J906
3
Black-Blue
Lower Left End-of-Stroke Switch
6
Orange
5
Black-Gray
Upper Left End-of-Stroke Switch
Orange

Right Flipper Circuit

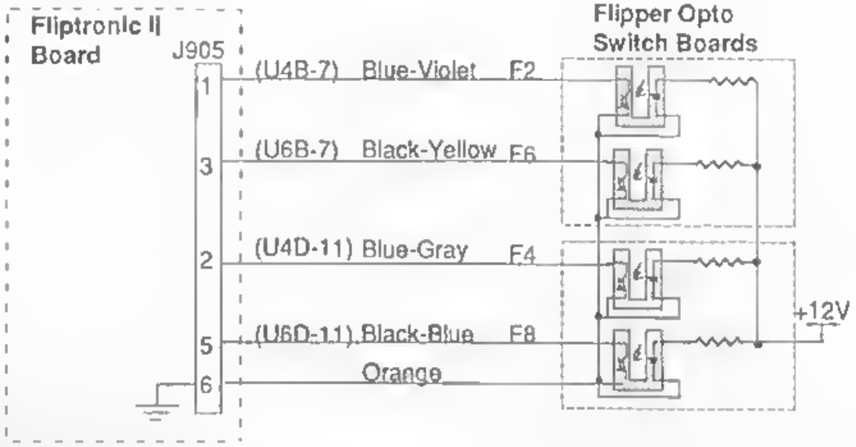

Fliptronic II Board
Playfield
J901
1
2
3
5
BR1
C2
F904
F902
J907
8
9
4
5
Blue-Yellow
Blue-Yellow
Lower Right Flipper
J902
13
11
Blue-Violet
Power
Orange-Green
Holding
Upper Right Flipper
6
Black-Yellow
Power
4
Orange-Violet
Holding
J906
1
Black-Green
Lower Right End-of-Stroke Switch
6
Orange
4
Black-Violet
Upper Right End-of-Stroke Switch
Orange

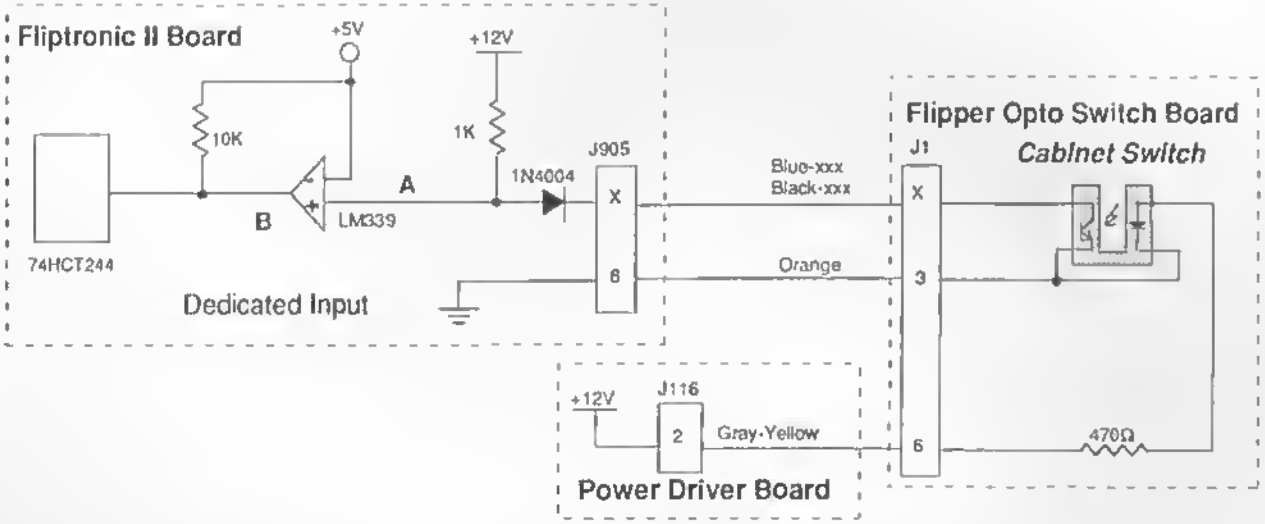
Fliptronic II Flipper Cabinet Switch Circuit Diagram


Power Driver Board
J116
2
Gray-Yellow +12V
Fliptronic II Board
J905
6
2
5
1
3
Orange Ground
Blue-Gray L. Left Flipper F4
Black-Blue U. Left Flipper F8
Blue-Violet L. Right Flipper F2
Black-Yellow U. Right Flipper F6
6
7
3
4
1
2
J1
Left Flipper Opto Switch Board
Right Flipper Opto Switch Board

Fliptronic II Flipper Cabinet Switches

F2	Lower Right Flipper
F6	Upper Right Flipper
F4	Lower Left Flipper
F8	Upper Left Flipper


Fliptronic II Board
J905
1
3
2
5
6
(U4B-7) Blue-Violet F2
(U6B-7) Black-Yellow F6
(U4D-11) Blue-Gray F4
(U6D-11) Black-Blue F8
Orange
Flipper Opto Switch Boards
+12V


Fliptronic II Board
+5V
10K
74HCT244
B
LM339
A
+12V
1K
1N4004
J905
X
6
Dedicated Input
Blue-xxx
Black-xxx
Orange
Flipper Opto Switch Board
Cabinet Switch
J1
X
3
6
470Ω
+12V
J116
2
Gray-Yellow
Power Driver Board

Switch	A	B	
Open	H	H	Off
Closed	L	L	On

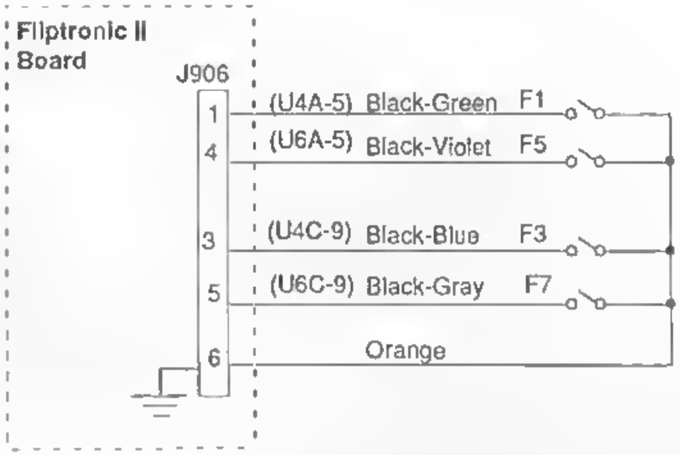
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

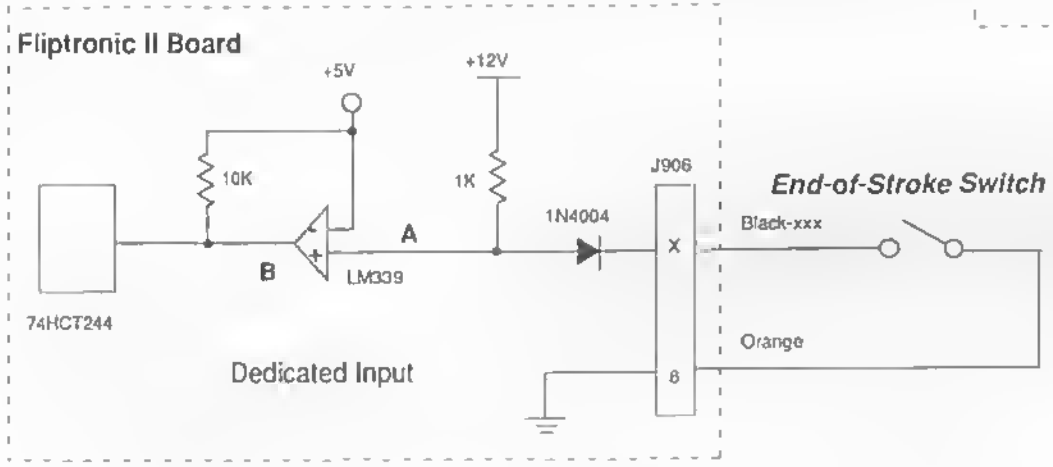
When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V therefore its output is low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

Fliptronic II Flipper End-of-Stroke Switches

F1 Lower Right Flipper
F5 Upper Right Flipper

F3 Lower Left Flipper
F7 Upper Left Flipper


Fliptronic II Board
J906
1
4
3
5
6
(U4A-5) Black-Green F1
(U6A-5) Black-Violet F5
(U4C-9) Black-Blue F3
(U6C-9) Black-Gray F7
Orange

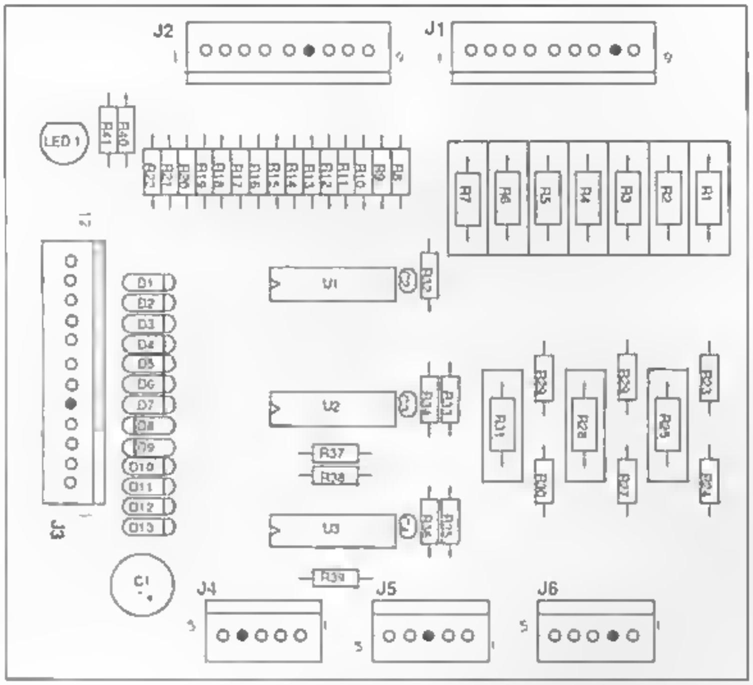

Fliptronic II Board
+5V
+12V
10K
1K
A
B
LM339
74HCT244
1N4004
J906
X
8
Dedicated Input
End-of-Stroke Switch
Black-xxx
Orange

Switch	A	B	
Open	H	H	Off
Closed	L	L	On

The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V therefore its output is low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

A-15430
10 Sw.-Opto PCB Assembly



J2
J1
LED 1
R40
R41
R21 R20 R19 R18 R17 R16 R15 R14 R13 R12 R11 R10 R9 R8
R7 R6 R5 R4 R3 R2 R1
U1
U2
U3
R37
R38
R39
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13
J3
C1
J4
J5
J6

J1 - 1 Gray-Violet (Switch 57, Castle 3) to LED board anode
J1 - 2 Gray-Blue (Switch 56, Crypt Popper) to LED board anode
J1 - 3 Gray-Green (Switch 55, Wire Ramp Popper) to LED board anode
J1 - 4 Gray-Black (Switch 54, Castle 2) to LED board anode
J1 - 5 Gray-Orange (Switch 53, Castle 1) to LED board anode
J1 - 6 Gray-Red (Switch 52, Magnet Left Pocket) to LED board anode
J1 - 7 Gray-Brown (Switch 51, T.R. Lane) to LED board anode
J1 - 8 Key
J1 - 9 Black (Ground) to LED board cathode

J2 - 1 Orange-Violet (Switch 57, Castle 3) to Photo Transistor board emmiter
J2 - 2 Orange-Blue (Switch 56, Crypt Popper) to Phot Transistor board emitter
J2 - 3 Orange-Green (Switch 55, Wire Ramp Popper) to Photo Transistor board emitter
J2 - 4 Orange-Yellow (Switch 54, Castle 2) to Photo Transistor board emitter
J2 - 5 Orange-Black (Switch 53, Castle 1) to Photo Transistor board emitter
J2 - 6 Key
J2 - 7 Orange-Red (Switch 52, Magnet Left Pocket) to Photo Transistor board emitter
J2 - 8 Orange-Green (Switch 51, T.R. Lane) to Photo Transistor board emitter
J2 - 9 Gray-Yellow (+12V) to Photo Transistor board collector

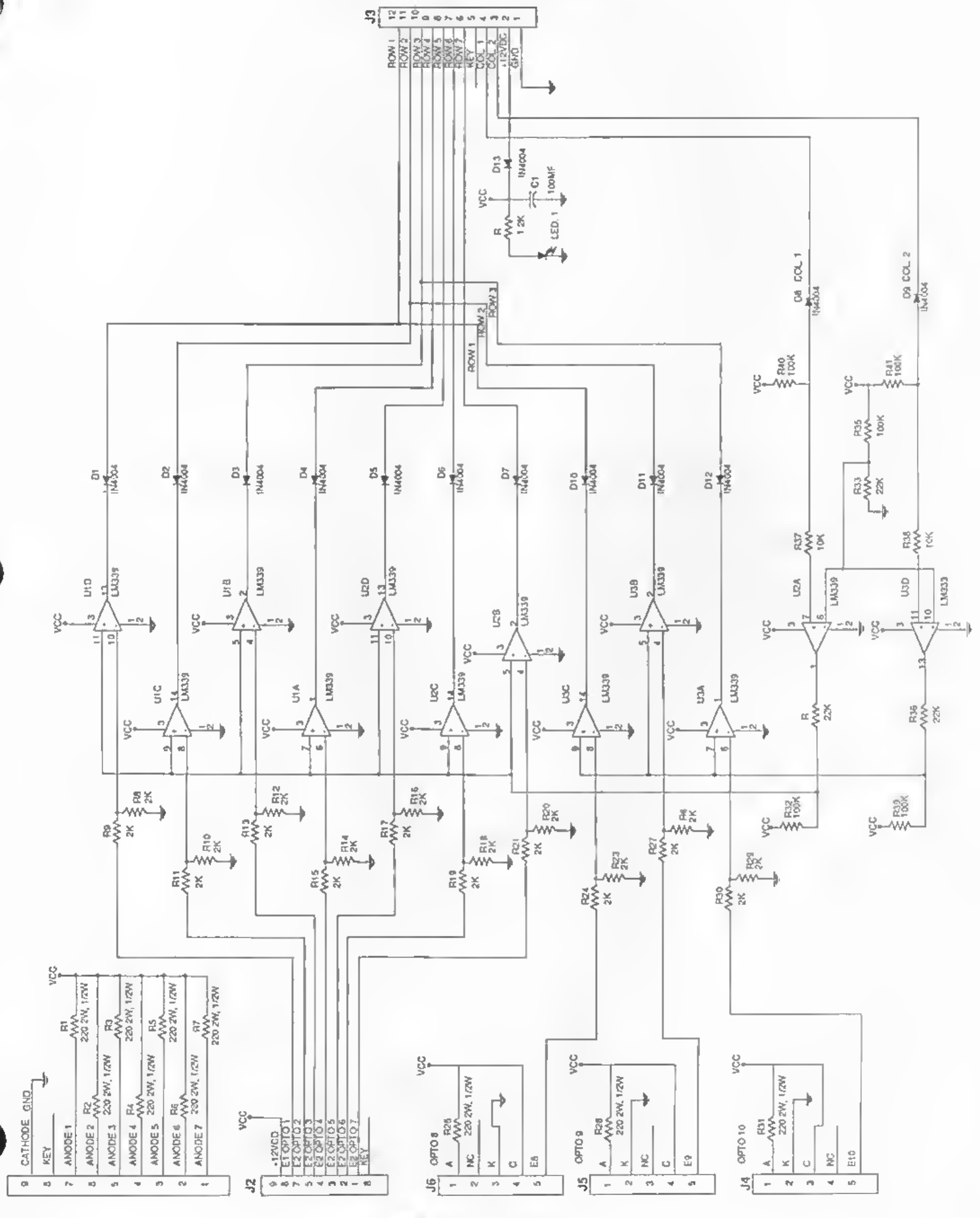
J3 - 1 Black (Ground) from Power Driver Board J118-3
J3 - 2 Gray-Yellow (+12V) from Power Driver Board J118-2
J3 - 3 Green-Violet (Switch Column 7) from CPU J207-7
J3 - 4 Green-Black (Switch Column 5) from CPU J207-5
J3 - 5 Key
J3 - 6 White-Violet (Switch Row 7) from CPU J209-8
J3 - 7 White-Blue (Switch Row 6 from CPU J209-7
J3 - 8 White-Green (Switch Row 5) from CPU J209-5
J3 - 9 White-Yellow (Switch Row 4) from CPU J209-4
J3 - 10 White-Orange (Switch Row 3) from CPU J209-3
J3 - 11 White-Red (Switch Row 2) from CPU J209-2
J3 - 12 White-Green (Switch Row1) from CPU J209-1

J4 - 1 Gray-Orange (Switch 73, Left Ramp Entry) to LED board anode
J4 - 2 NC
J4 - 3 NC
J4 - 4 Key
J4 - 5 Orange-Black (Switch 73, Left Ramp Entry) to Photo Transistor board emitter

J5 - 1 Gray-Red (Switch 72, Coffin Popper) to LED board anode
J5 - 2 NC
J5 - 3 Key
J5 - 4 NC
J5 - 5 Orange-Red (Switch 72, Coffin Popper) to Photo Transistor board emitter

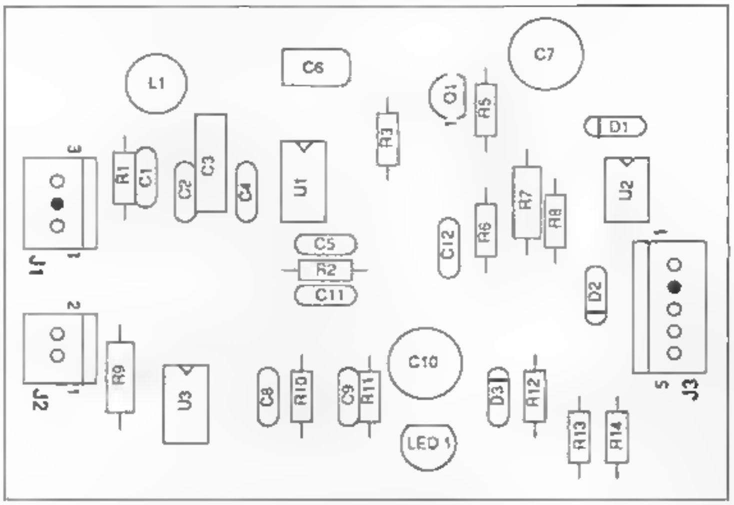
J6 - 1 Gray-Brown (Switch 71, Castle Popper) to LED board anode
J6 - 2 Key
J6 - 3 NC
J6 - 4 NC
J6 - 5 Orange-Brown (Switch 71, Castle Popper) to Photo Transistor board emitter

A-15430
10 Sw.-PCB Schematic



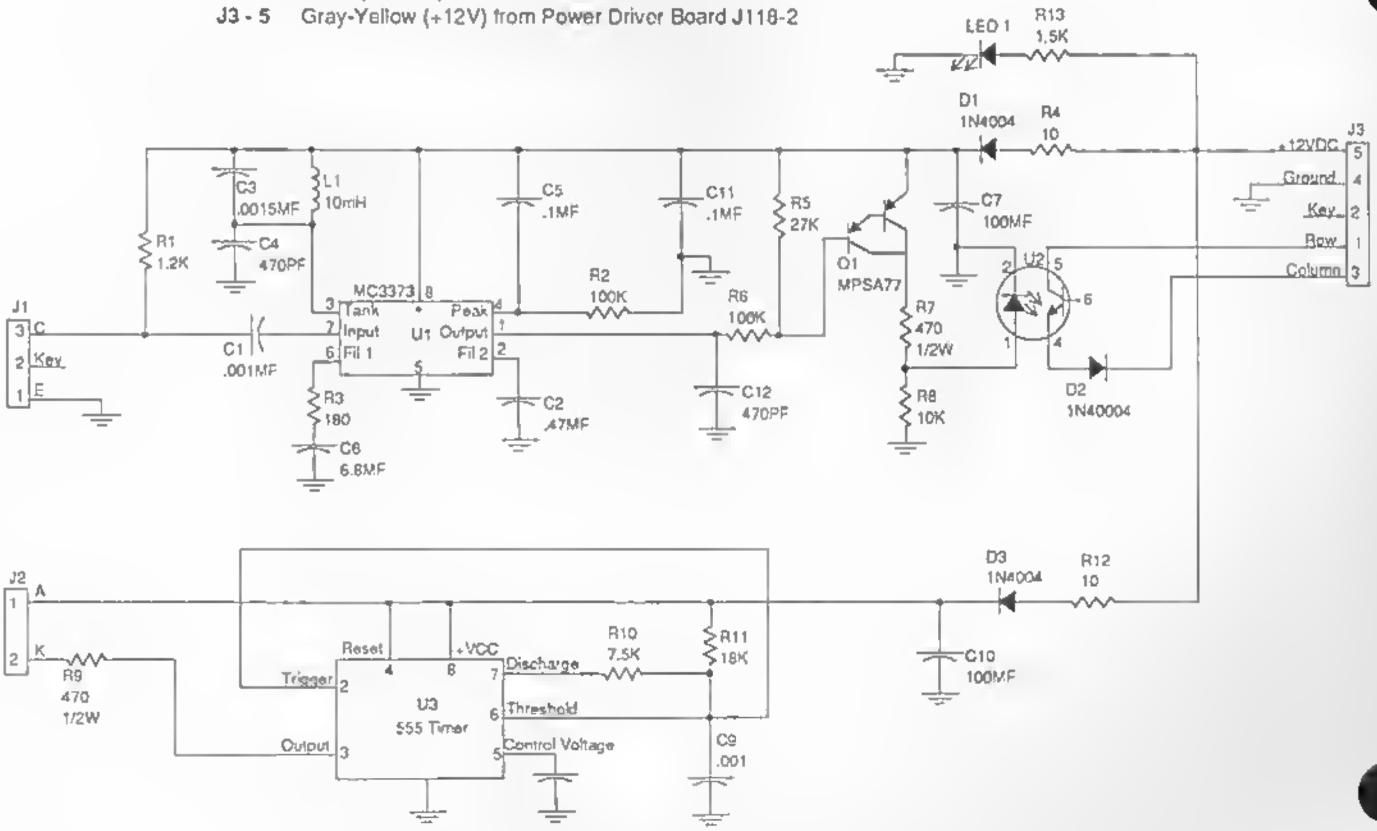
J3
ROW 1
ROW 2
ROW 3
ROW 4
ROW 5
ROW 6
ROW 7
KEY
COL 1
COL 2
+12VDC
GND
D13 1N4004
C1 100MF
VCC
R 1.2K
LED 1
D8 COL 1 1N4004
D9 COL 2 1N4004
R40 100K
R41 100K
R35 100K
R33 22K
R37 10K
R38 10K
U2A LM339
U3D LM339
R 22K
R36 22K
R32 100K
R39 100K
D1 1N4004
D2 1N4004
D3 1N4004
D4 1N4004
D5 1N4004
D6 1N4004
D7 1N4004
D10 1N4004
D11 1N4004
D12 1N4004
U1D LM339
U1B LM339
U2D LM339
U2B LM339
U3B LM339
U1C LM339
U1A LM339
U2C LM339
U3C LM339
U3A LM339
R8 2K
R9 2K
R10 2K
R11 2K
R12 2K
R13 2K
R14 2K
R15 2K
R16 2K
R17 2K
R18 2K
R19 2K
R20 2K
R21 2K
R23 2K
R24 2K
R4 2K
R27 2K
R29 2K
R30 2K
R1 220 2W, 1/2W
R2 220 2W, 1/2W
R3 220 2W, 1/2W
R4 220 2W, 1/2W
R5 220 2W, 1/2W
R6 220 2W, 1/2W
R7 220 2W, 1/2W
J1
CATHODE GND
KEY
ANODE 1
ANODE 2
ANODE 3
ANODE 4
ANODE 5
ANODE 6
ANODE 7
J2
+12VCD
E1 OPTO 1
E2 OPTO 2
E2 OPTO 3
E2 OPTO 4
E2 OPTO 5
E2 OPTO 6
E2 OPTO 7
KEY
J6
OPTO 8
R25 220 2W, 1/2W
A
NC
K
C
E8
J5
OPTO 9
R28 220 2W, 1/2W
A
K
NC
C
E9
J4
OPTO 10
R31 220 2W, 1/2W
A
K
C
NC
E10

A-15646
24-Opto PCB Assembly & Schematic



L1
C6
C7
Q1
R5
R3
D1
3
R1
C1
C2
C3
C4
U1
R7
R8
U2
C5
R2
C11
C12
R6
1
J1
1
D2
2
J2
1
R9
U3
C8
R10
C9
R11
C10
D3
R12
R13
R14
LED 1
5
J3

J1 - 1	Black/Drain (Silver) (Switch 82, Ball On Magnet) to Photo Transistor Board emitter
J1 - 2	Key
J1 - 3	Red (+12V) to Photo Transistor Board collector
J2 - 1	Gray (Switch 82, Ball On Magnet) to LED board anode
J2 - 2	Black (Ground) to LED board cathode
J3 - 1	White-Red (Switch Row 2) from CPU J209-2
J3 - 2	Key
J3 - 3	Green-Gray (Switch Column 8) from CPU J207-9
J3 - 4	Black (Ground) from Power Driver Board J118-3
J3 - 5	Gray-Yellow (+12V) from Power Driver Board J118-2

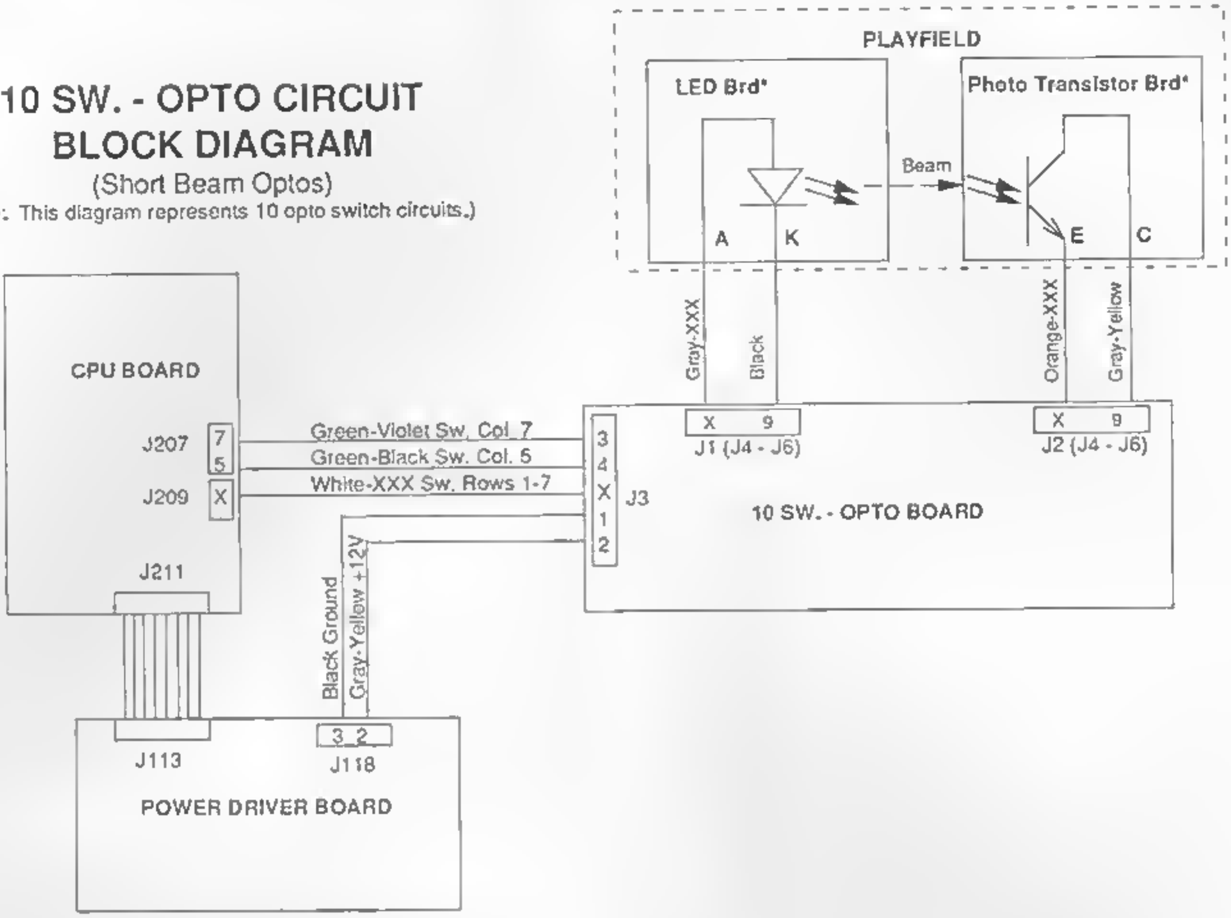


LED 1
R13
1.5K
D1
1N4004
R4
10
J3
+12VDC
5
Ground
4
Key
2
Row
1
Column
3
C3
.0015MF
L1
10mH
C4
470PF
R1
1.2K
C5
.1MF
C11
.1MF
R5
27K
C7
100MF
Q1
MPSA77
U2
J1
3
C
2
Key
1
E
C1
.001MF
MC3373
8
Tank
Peak
Input
U1
Output
Fil 1
Fil 2
3
7
6
5
4
1
2
R2
100K
R6
100K
C12
470PF
R7
470
1/2W
R8
10K
D2
1N40004
R3
180
C6
6.8MF
C2
.47MF
J2
1
A
2
K
R9
470
1/2W
D3
1N4004
R12
10
Reset
+VCC
4
8
7
Discharge
R10
7.5K
R11
18K
Trigger
2
U3
555 Timer
6
Threshold
Output
3
5
Control Voltage
C9
.001
C10
100MF

10 SW. - OPTO CIRCUIT BLOCK DIAGRAM

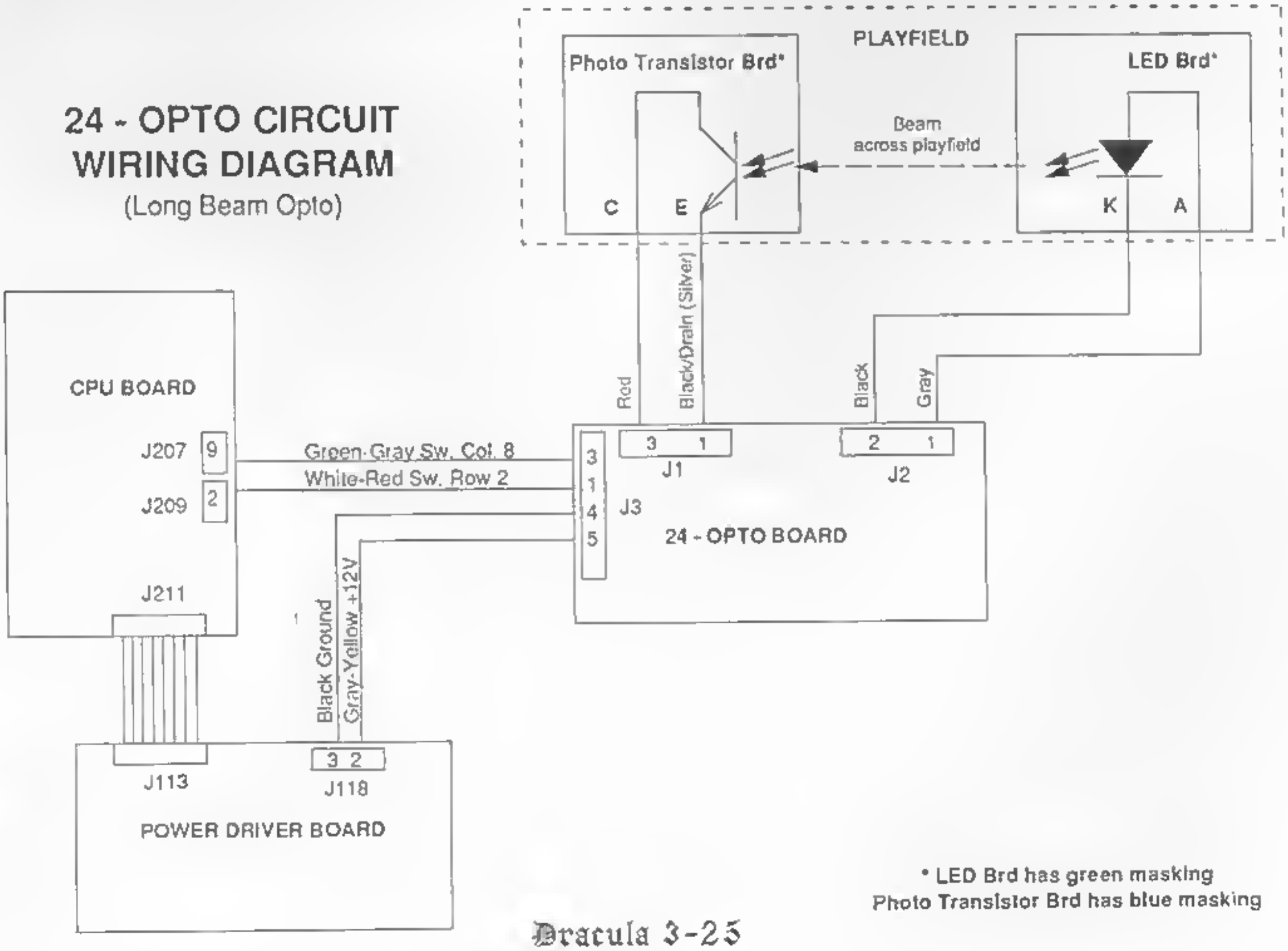
(Short Beam Optos)

(Note: This diagram represents 10 opto switch circuits.)


PLAYFIELD
LED Brd*
Photo Transistor Brd*
Beam
A
K
E
C
Gray-XXX
Black
Orange-XXX
Gray-Yellow
CPU BOARD
J207
7
5
J209
X
Green-Violet Sw. Col. 7
Green-Black Sw. Col. 5
White-XXX Sw. Rows 1-7
3
4
X
1
2
J3
X 9
J1 (J4 - J6)
X 9
J2 (J4 - J6)
10 SW. - OPTO BOARD
J211
Black Ground
Gray-Yellow +12V
3 2
J113
J118
POWER DRIVER BOARD

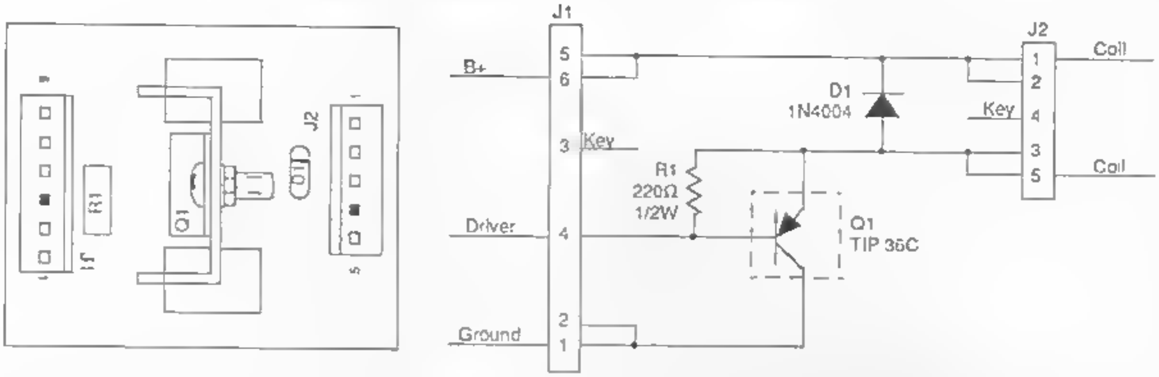
24 - OPTO CIRCUIT WIRING DIAGRAM

(Long Beam Opto)


PLAYFIELD
Photo Transistor Brd*
LED Brd*
Beam across playfield
C
E
K
A
Red
Black/Drain (Silver)
Black
Gray
CPU BOARD
J207
9
J209
2
Green-Gray Sw. Col. 8
White-Red Sw. Row 2
3
1
4
5
J3
3 1
J1
2 1
J2
24 - OPTO BOARD
J211
Black Ground
Gray-Yellow +12V
3 2
J113
J118
POWER DRIVER BOARD

* LED Brd has green masking
Photo Transistor Brd has blue masking

A-16697-1
High Current Driver Assembly

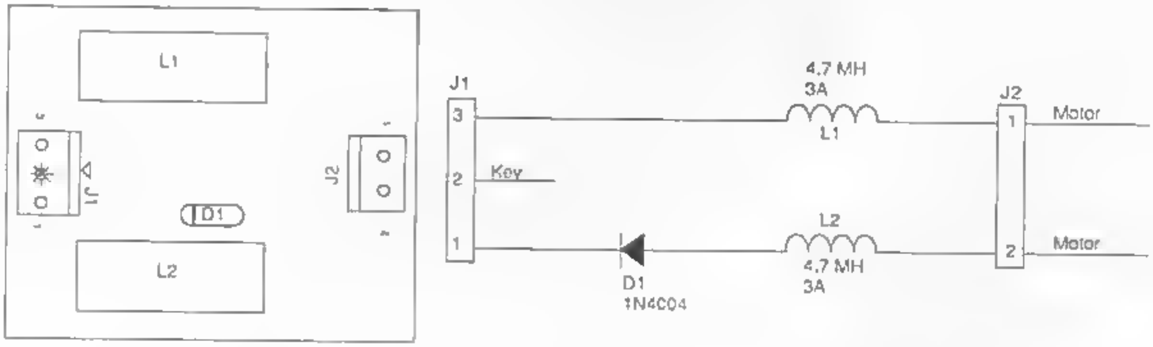


J1
R1
Q1
J2
B+
Key
Driver
Ground
D1
1N4004
R1
220Ω
1/2W
Q1
TIP 36C
Coil
Coil

J1 - 1	Black (Ground) from Power Driver Board J103-1
J1 - 2	NC
J1 - 3	Key
J1 - 4	Blue (Blue-Orange, Sol. 27 drive) from Power Driver Board J122-1
J1 - 5	NC
J1 - 6	Violet-Green (+50V) from Power Driver Board J107-1

J2 - 1	Violet-Green to Magnet
J2 - 2	NC
J2 - 3	NC
J2 - 4	Key
J2 - 5	Blue to Magnet

A-15542
Motor EMI Board Assembly



L1
J1
D1
J2
L2
J1
Key
4.7 MH
3A
L1
L2
4.7 MH
3A
D1
1N4004
J2
Motor
Motor

J1 - 1	Blue-Yellow (Sol. 28 drive) from Power Driver Board J122-4
J1 - 2	Key
J1 - 3	Red-White (+20V) from Power Driver Board J107-6

J2 - 1	Red to Motor
J2 - 2	Blue-Yellow to Motor

MOTOR & MAGNET CIRCUIT

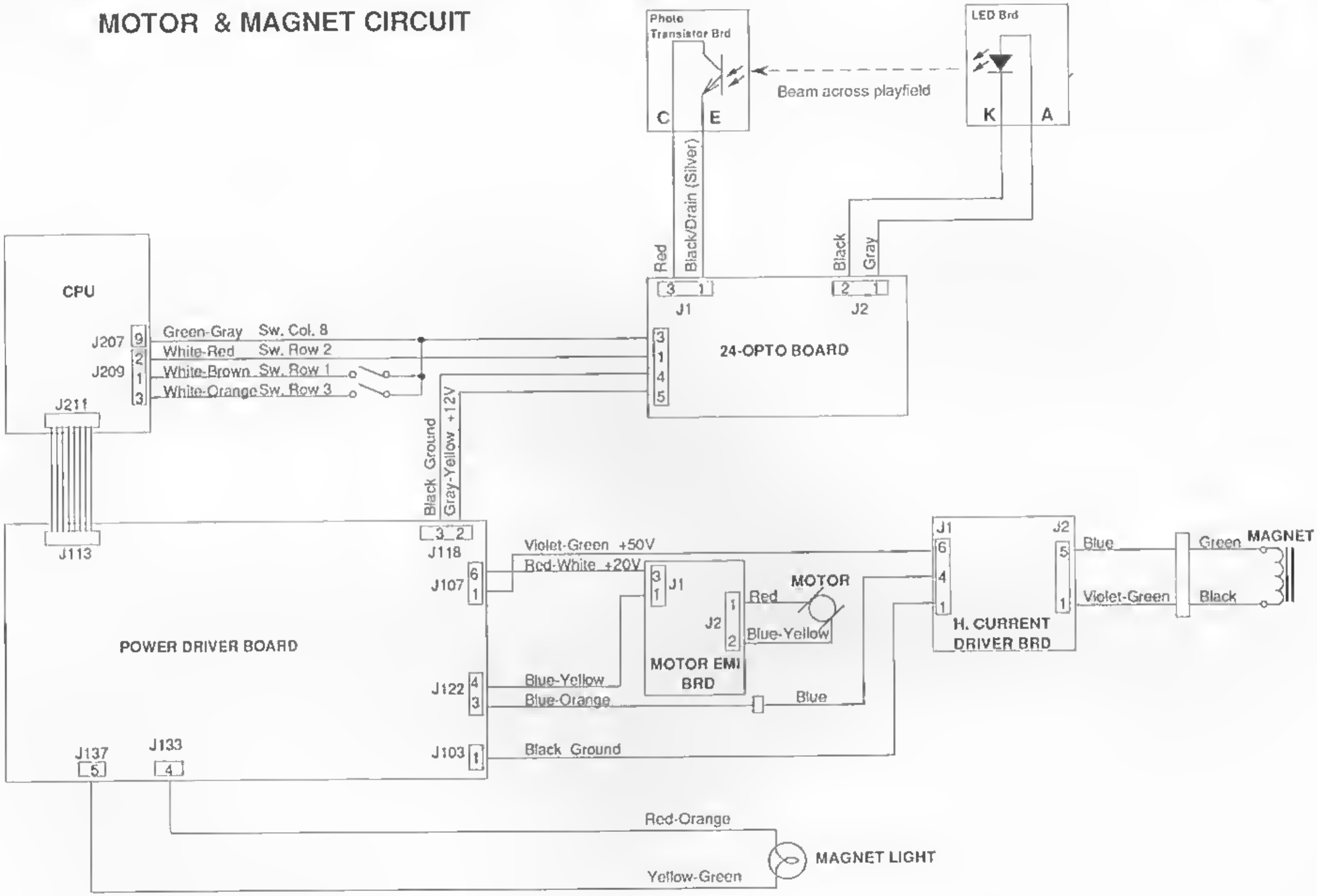
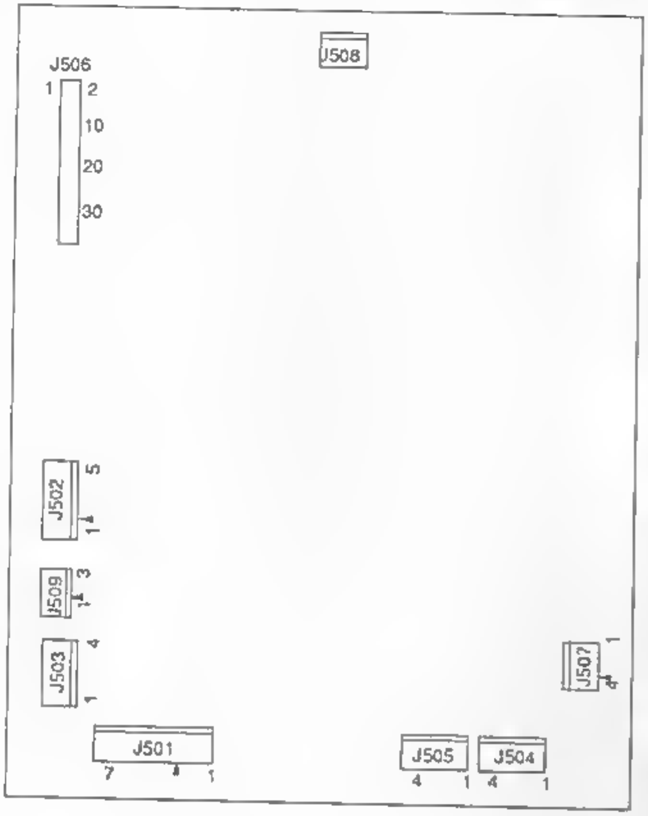


Photo Transistor Brd
C
E
LED Brd
K
A
Beam across playfield
Red
Black/Drain (Silver)
Black
Gray
J1
J2
24-OPTO BOARD
CPU
J207
J209
J211
Green-Gray Sw. Col. 8
White-Red Sw. Row 2
White-Brown Sw. Row 1
White-Orange Sw. Row 3
Black Ground
Gray-Yellow +12V
J113
J118
J107
J122
J103
J137
J133
POWER DRIVER BOARD
Violet-Green +50V
Red-White +20V
Blue-Yellow
Blue-Orange
Black Ground
MOTOR EMI BRD
MOTOR
Red
Blue-Yellow
Blue
H. CURRENT DRIVER BRD
Blue
Violet-Green
Green
Black
MAGNET
Red-Orange
Yellow-Green
MAGNET LIGHT

A-12738-50001
Audio Board
Interboard Wiring



J506
1
2
10
20
30
J508
J502
5
1
J509
3
1
J503
4
1
J507
1
4
J501
7
4
1
J505
4
1
J504
4
1

J501 - 1	Gray-Green (18VAC) from xformer secondary
J501 - 2	Gray-Green (18VAC) loop from J501-1
J501 - 3	N/C
J501 - 4	Gray (18VAC) from xformer secondary
J501 - 5	Gray (18VAC) loop from J501-4
J501 - 6	Gray-White (18VAC) from xformer secondary
J501 - 7	Gray-White (18VAC) loop from J501-6

J502 - 1	Gray (+5V) from Power Driver Board J114-3,4
J502 - 2	N/C
J502 - 3	Gray (+5V) from Power Driver Board J114-3,4
J502 - 4	Black (Grd) from Power Driver Board J114-5,7
J502 - 5	Black (Grd) from Power Driver Board J114-5,7

J503 - Not Used

J504 - 1	N/C
J504 - 2	N/C
J504 - 3	Black (signal) to speaker
J504 - 4	N/C

J505 - 1	N/C
J505 - 2	Black-Yellow (signal) to speaker
J505 - 3	N/C
J505 - 4	N/C

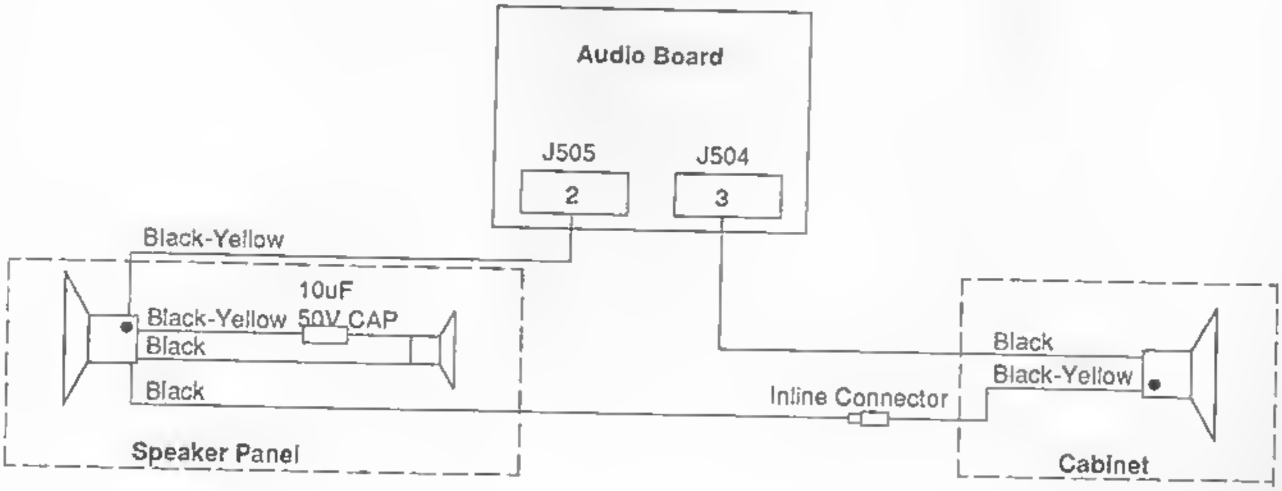
J506, 4-pin Ribbon Cable	(data) To/from J601; J903; J202

J507 - Not Used

J508 - 1	N/C
J508 - 2	N/C
J508 - 3	N/C
J508 - 4	N/C

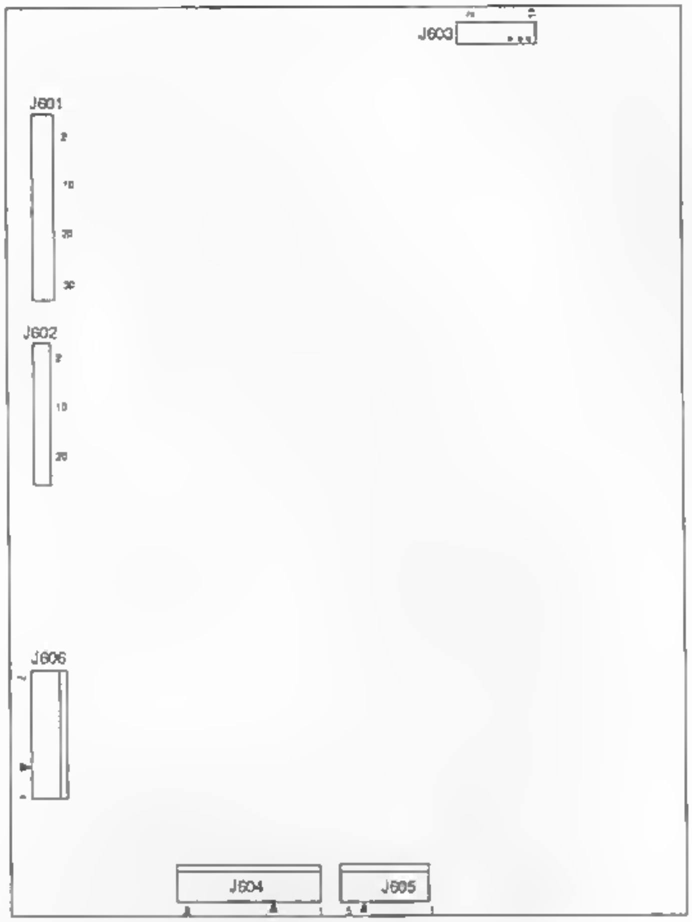
J509 - 1	N/C
J509 - 2	N/C
J509 - 3	N/C

Speaker Wiring Diagram



Audio Board
J505
2
J504
3
Black-Yellow
10uF
50V CAP
Black-Yellow
Black
Black
Speaker Panel
Inline Connector
Black
Black-Yellow
Cabinet

A-14039
Dot Matrix Controller Board
Interboard Wiring



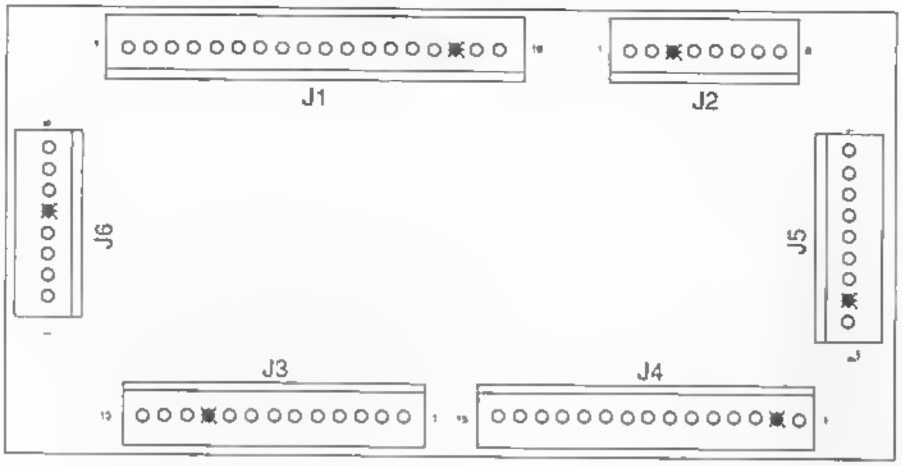
J601, 34-pin Ribbon Cable	(data) To/from J202; J903; J506
J602, 26-pin Ribbon Cable	(data) To/from J201
J603, 14-pin Ribbon Cable	(data) To/from Dot Matrix Display/Driver

J604 - 1	Orange (-125V) to Display/Driver pin 1
J604 - 2	Blue (-113V) to Display/Driver pin 2
J604 - 3	N/C
J604 - 4	Black (Grd) to Display/Driver pin 4
J604 - 5	Black (Grd) to Display/Driver pin 5
J604 - 6	Gray (+5V) to Display/Driver pin 6
J604 - 7	Gray-Yellow (+12V) to Display/Driver pin 7
J604 - 8	Brown (+62V) to Display/Driver pin 8

J605 - 1	White (80VAC) from xformer secondary
J605 - 2	White (80VAC) from xformer secondary
J605 - 3	Violet (100VAC) from xformer secondary
J605 - 4	N/C
J605 - 5	Violet (100VAC) from xformer secondary

J606 - 1	Black (Grd) loop from J606-3
J606 - 2	N/C
J606 - 3	Black (Grd) from Power Driver Brd J117-3
J606 - 4	Gray (+5V) loop from J606-5
J606 - 5	Gray (+5V) from Power Driver Brd J117-4
J606 - 6	Gray-Yellow (+12V) loop from J606-7
J606 - 7	Gray-Yellow (+12V) from Power Driver Brd J117-2

A-14689
Coin Door Interface Board
Interboard Wiring



J1 - 1	Green-Brown (sw. col. 1) from CPU J212-1
J1 - 2	Red-Gray (lamp row 8) from Power Driver Brd J134-9
J1 - 3	White-Yellow (sw. row 4) from CPU J212-8
J1 - 4	White-Orange (sw. row 3) from CPU J212-7
J1 - 5	White-Red (sw. row 2) from CPU J212-6
J1 - 6	White-Brown (sw. row 1) from CPU J212-4
J1 - 7	Green-Red (sw. col. 2) from CPU J212-2
J1 - 8	Orange-Gray (dedicated sw. row 8) from CPU J205-9
J1 - 9	Orange-Violet (dedicated sw. row 7) from CPU J205-8
J1 - 10	Orange-Blue (dedicated sw. row 6) from CPU J205-7
J1 - 11	Orange-Green (dedicated sw. row 5) from CPU J205-6
J1 - 12	Orange-Black (dedicated sw. row 3) from CPU J205-3
J1 - 13	Orange-Red (dedicated sw. row 2) from CPU J205-2
J1 - 14	Orange-Brown (dedicated sw. row 1) from CPU J205-1
J1 - 15	Black (Grd) from CPU J205-10
J1 - 16	N/C
J1 - 17	Orange-Yellow (dedicated sw. row 4) from CPU J205-4
J1 - 18	Orange-White (sw. enable) from CPU J205-12

J2 - 1	Violet (G.I. return) from Power Driver Board J119-3
J2 - 2	Violet-White (G.I. 6.8VAC) from Power Driver Board J119-1
J2 - 3	N/C
J2 - 4	Gray-Yellow (+12V) from Power Driver Board J116-2
J2 - 5	Black (Grd) from Power Driver Board J116-3
J2 - 6	N/C
J2 - 7	N/C
J2 - 8	N/C

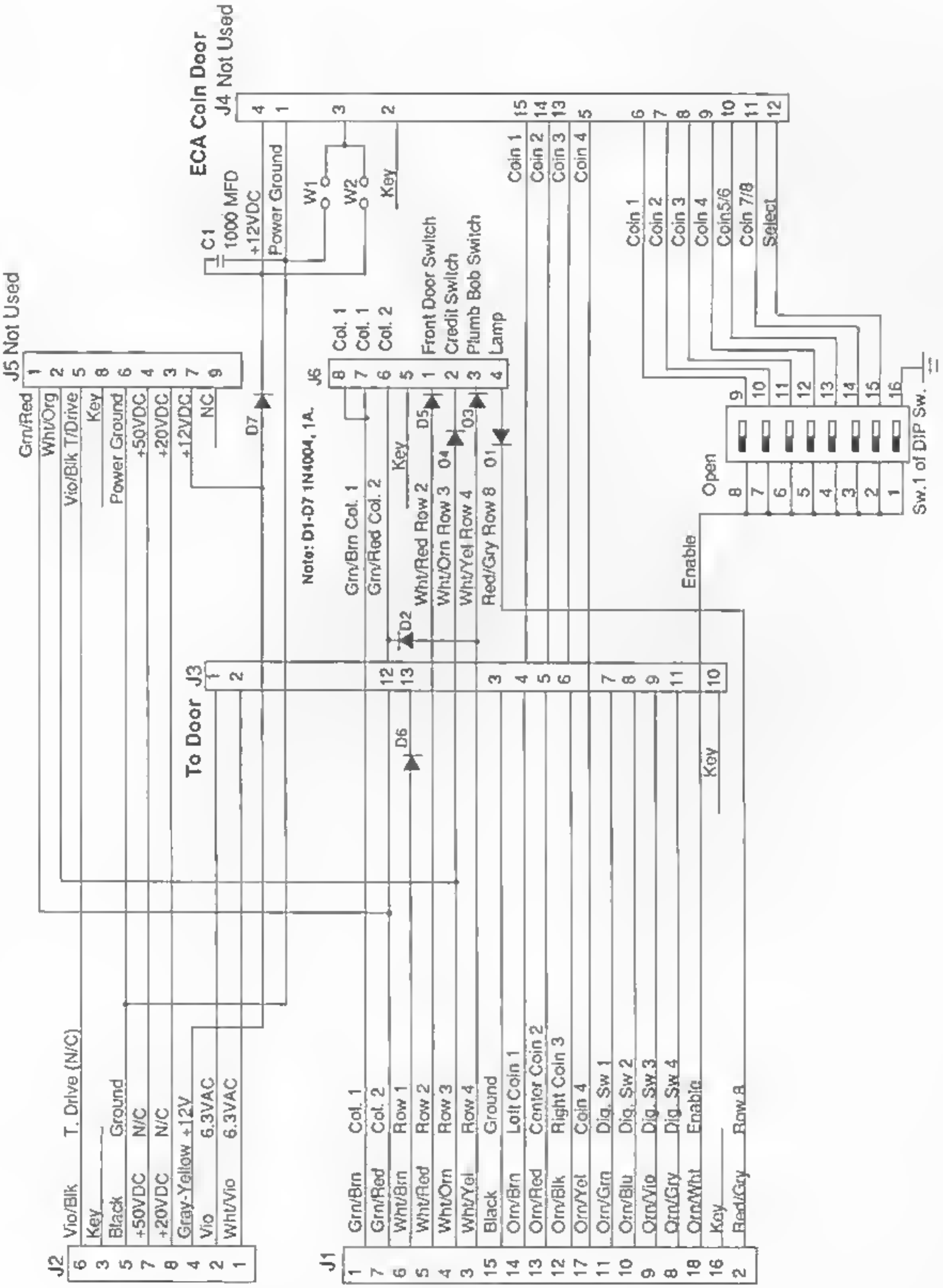
J3 - 1	Violet (G.I. return) to coin door
J3 - 2	White-Violet (G.I. 6.8VAC) to coin door
J3 - 3	Black (Grd) to Door
J3 - 4	Orange-Brown (dedicated sw. row 1) to coin door
J3 - 5	N/C
J3 - 6	Orange-Black (dedicated sw. row 3) to coin door
J3 - 7	Orange-Green (dedicated sw. row 4) to coin door
J3 - 8	Orange-Blue (dedicated sw. row 6) to coin door
J3 - 9	Orange-Violet (dedicated sw. row 7) to coin door
J3 - 10	N/C
J3 - 11	Orange -Gray (dedicated sw.row 8) to coin door
J3 - 12	Green-Red (sw. col. 2) to coin door
J3 - 13	White-Brown (sw. row 1) to coin door

J4 - Not Used

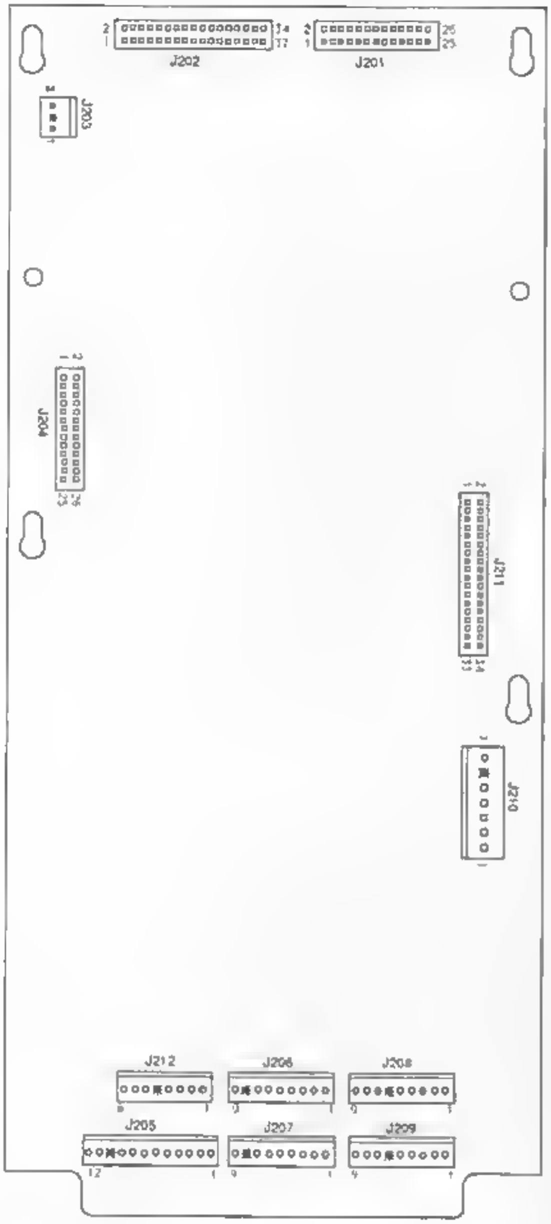
J5 - Not Used

J6 - 1	White-Red (sw. row 2) to cabinet
J6 - 2	White-Orange (sw. row 3) to cabinet
J6 - 3	White-Yellow (sw. row 3) to cabinet
J6 - 4	Red-Gray (lamp row 8) to cabinet
J6 - 5	N/C
J6 - 6	Green-Red (sw. col 2) to cabinet
J6 - 7	Green-Brown (sw. col 1) to cabinet
J6 - 8	Green-Brown (sw. col. 1) to cabinet

A-14689
Coin Door Interface Board Schematic


ECA Coin Door
J4 Not Used
C1
1000 MFD
+12VDC
Power Ground
W1
W2
Key
Coin 1
Coin 2
Coin 3
Coin 4
Coin 1
Coin 2
Coin 3
Coin 4
Coin5/6
Coin 7/8
Select
J5 Not Used
Grn/Red
Wht/Org
Vio/Blk T/Drive
Key
Power Ground
+50VDC
+20VDC
+12VDC
NC
D7
J6
Col. 1
Col. 1
Col. 2
Front Door Switch
Credit Switch
Plumb Bob Switch
Lamp
D5
D4
D3
D1
Note: D1-D7 1N4004, 1A.
Grn/Brn Col. 1
Grn/Red Col. 2
Key
Wht/Red Row 2
Wht/Orn Row 3
Wht/Yel Row 4
Red/Gry Row 8
D2
Open
Enable
Sw.1 of DIP Sw.
J3
To Door
D6
Key
J2
Vio/Blk T. Drive (N/C)
Key
Black Ground
+50VDC N/C
+20VDC N/C
Gray-Yellow +12V
Vio 6.3VAC
Wht/Vio 6.3VAC
J1
Grn/Brn Col. 1
Grn/Red Col. 2
Wht/Brn Row 1
Wht/Red Row 2
Wht/Orn Row 3
Wht/Yel Row 4
Black Ground
Orn/Brn Left Coin 1
Orn/Red Center Coin 2
Orn/Blk Right Coin 3
Orn/Yel Coin 4
Orn/Grn Dig. Sw 1
Orn/Blu Dig. Sw 2
Orn/Vio Dig. Sw 3
Orn/Gry Dig. Sw 4
Orn/Wht Enable
Key
Red/Gry Row 8

A-12742-50001
CPU Board



J201, 26-pin Ribbon Cable (data) To/from J602

J202, 34-pin Ribbon Cable (data) To/from J903; J506; J601

J203 - Not Used

J204 - Not Used

J205 - 1 Orange-Brown (ded. sw. row 1) to Coin Door Brd J1-14
J205 - 2 Orange-Red (ded. sw. row 2) to Coin Door Brd J1-13
J205 - 3 Orange-Black (ded. sw. row 3) to Coin Door Brd J1-12
J205 - 4 Orange-Yellow (ded. sw. row 4) to Coin Door J1-17
J205 - 5 N/C
J205 - 6 Orange-Green (ded. sw. row 5) to Coin Door Brd J1-11
J205 - 7 Orange-Blue (ded. sw. row 6) to Coin Door Brd J1-10
J205 - 8 Orange-Violet (ded. sw. row 7) to Coin Door Brd J1-9
J205 - 9 Orange-Gray (ded. sw. row 8) to Coin Door Brd J1-8
J205 - 10 Black (Grd) to Coin Door Brd J1-15
J205 - 11 N/C
J205 - 12 Orange-White (sw. enable) to Coin Door Brd J1-18

J206 - 1 N/C
J206 - 2 N/C
J206 - 3 N/C
J206 - 4 N/C
J206 - 5 N/C
J206 - 6 N/C
J206 - 7 N/C
J206 - 8 N/C
J206 - 9 N/C

J207 - 1 Green-Brown (sw. col. 1) to playfield switches
J207 - 2 Green-Red (sw. col. 2) to playfield/cabinet switches
J207 - 3 Green-Orange (sw. col. 3) to playfield switches
J207 - 4 Green-Yellow (sw. col. 4) to playfield switches
J207 - 5 Green-Black (sw. col. 5) to playfield switches
J207 - 6 Green-Blue (sw. col. 6) to playfield switches
J207 - 7 Green-Violet (sw. col. 7) to playfield switches
J207 - 8 N/C
J207 - 9 Green-Gray (sw. col. 8) to playfield switches

J208 - 1 N/C
J208 - 2 N/C
J208 - 3 N/C
J208 - 4 N/C
J208 - 5 N/C
J208 - 6 N/C
J208 - 7 N/C
J208 - 8 N/C
J208 - 9 N/C

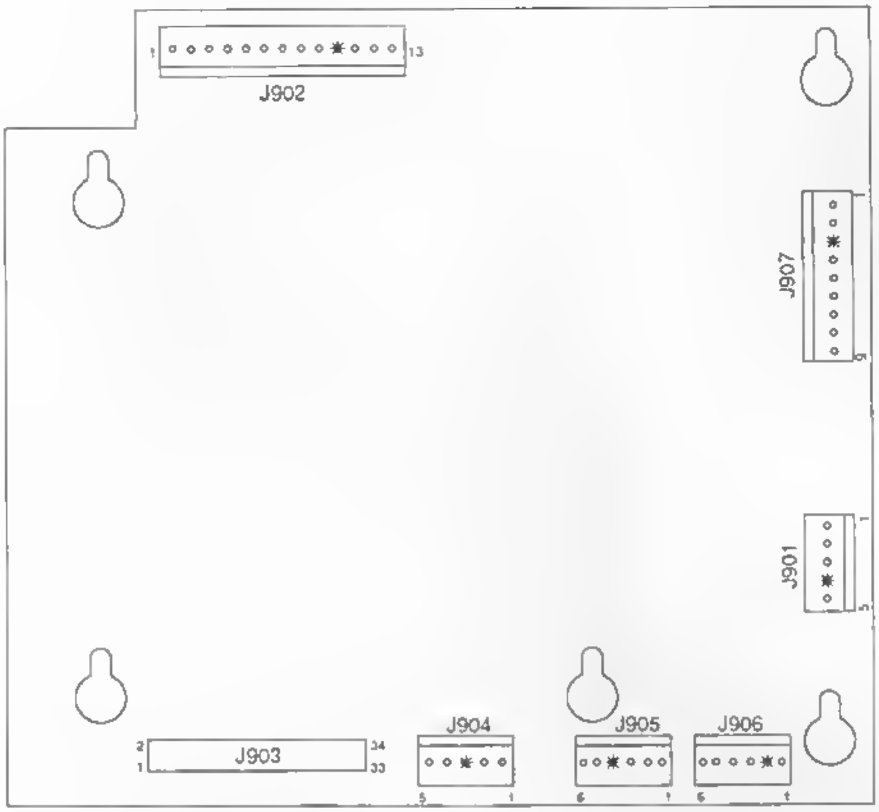
J209 - 1 White-Brown (sw. row 1) to playfield switches
J209 - 2 White-Red (sw. row 2) to playfield switches
J209 - 3 White-Orange (sw. row 3) to playfield switches
J209 - 4 White-Yellow (sw. row 4) to playfield switches
J209 - 5 White-Green (sw. row 5) to playfield switches
J209 - 6 N/C
J209 - 7 White-Blue (sw. row 6) to playfield switches
J209 - 8 White-Violet (sw. row 7) to playfield switches
J209 - 9 White-Gray (sw. row 8) to playfield switches

J210 - 1 Black (Grd) from Power Driver Brd J114-5,7
J210 - 2 N/C
J210 - 3 Black (Grd) from Power Driver Brd J114-5,7
J210 - 4 Gray (+5V) from Power Driver Brd J114-3,4
J210 - 5 Gray (+5V) from Power Driver Brd J114-3,4
J210 - 6 Gray-Green (+12V) from Power Driver Brd J114-1,2
J210 - 7 Gray-Green (+12V) from Power Driver Brd J114-1,2

J211, 34-pin Ribbon Cable (data) To/from J113

J212 - 1 Green-Brown (sw. col. 1) to Coin Door Brd J1-1
J212 - 2 Green-Red (sw. col. 2) to Coin Door J1-7
J212 - 3 N/C
J212 - 4 White-Brown (sw. row 1) to Coin Door Brd J1-6
J212 - 5 N/C
J212 - 6 White-Red (sw. row 2) to Coin Door Brd J1-5
J212 - 7 White-Orange (sw. row 3) Coin Door Brd J1-4
J212 - 8 White-Yellow (sw. row 4) to Coin Door Brd J1-3

A-15472
Fliptronic II Board
Interboard Wiring



J901 - 1	White-Blue (50VAC) from Power Driver Board J104-2
J901 - 2	White-Blue (50VAC) loop from J901-1
J901 - 3	White-Blue (50VAC) from Power Driver Board J104-1
J901 - 4	N/C
J901 - 5	White-Blue (50VAC) loop from J901-3
J902 - 1	Orange-Gray (holding) upper left flipper coil
J902 - 2	Black-Blue (power) upper left flipper coil
J902 - 3	N/C
J902 - 4	Orange-Violet (holding) upper right flipper coil
J902 - 5	N/C
J902 - 6	Black-Yellow (power) upper right flipper coil
J902 - 7	Orange-Blue (holding) lower left flipper coil
J902 - 8	N/C
J902 - 9	Blue-Gray (power) lower left flipper coil
J902 - 10	N/C
J902 - 11	Orange-Green (holding) lower right flipper coil
J902 - 12	N/C
J902 - 13	Blue-Violet (power) lower right flipper coil

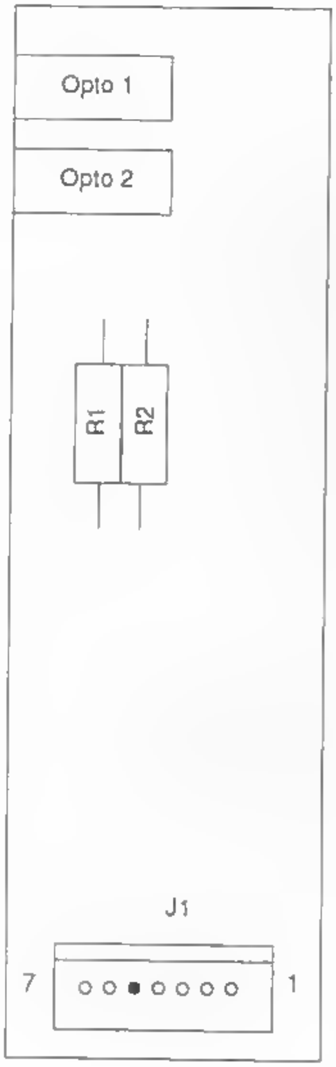
J903, 34-pin Ribbon Cable (data) To/from J202; J601; J506

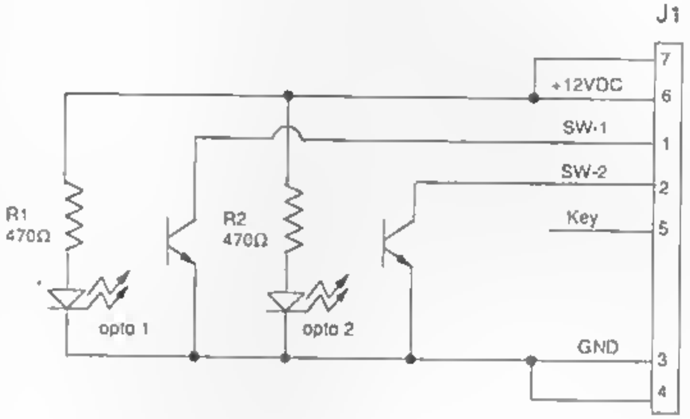
J904 - 1	Gray (+5V) from Power Driver Board J114-3,4
J904 - 2	Gray-Green (+12V) from Power Driver Board J114-1,2
J904 - 3	N/C
J904 - 4	Black (Grd) from Power Driver Board J114-5,7
J904 - 5	Black (Grd) from Power Driver Board J114-5,7

J905 - 1	Blue-Violet to right opto switch board J1-1
J905 - 2	Blue-Gray to left opto switch board J1-1
J905 - 3	Black-Yellow to right opto switch board J1-2
J905 - 4	N/C
J905 - 5	Black-Blue to left opto switch board J1-2
J905 - 6	Orange (Grd) to left opto switch board J1-3
J906 - 1	Black-Green to lower right EOS switch
J906 - 2	N/C
J906 - 3	Black-Blue to lower left EOS switch
J906 - 4	N/C
J906 - 5	N/C
J906 - 6	Orange (Grd) to EOS switches
J907 - 1	Gray-Yellow (+50V) to upper left flipper coil
J907 - 2	Gray-Yellow (+50) loop from J907-1
J907 - 3	N/C
J907 - 4	Blue-Yellow (+50V) to upper right flipper coil
J907 - 5	Blue-Yellow (+50V) loop from J907-4
J907 - 6	Gray-Yellow (+50V) to lower left flipper coil
J907 - 7	Gray-Yellow (+50V) loop from J907-6
J907 - 8	Blue-Yellow (+50V) to lower right flipper coil
J907 - 9	Blue-Yellow (+50V) loop from J907-8

NOTE: In this game, the upper right and upper left flipper circuits are used to drive solenoids 33, 34, 35 and 36.

A-15878
Flipper Cabinet Opto Switch Board & Schematic

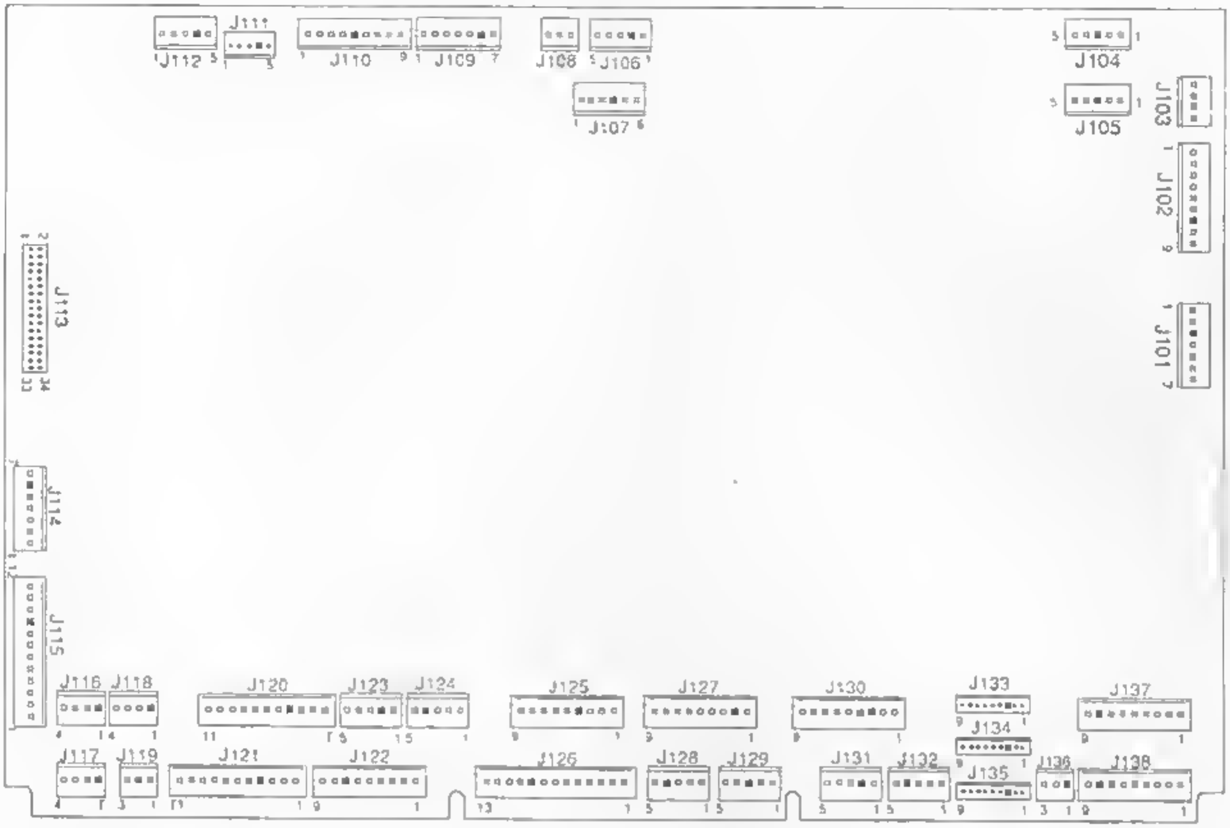

Opto 1
Opto 2
R1
R2
J1
7
1


J1
7
+12VDC
6
SW-1
1
SW-2
2
Key
5
R1
470Ω
R2
470Ω
opto 1
opto 2
GND
3
4

Left Side Flipper Cabinet Opto Switch Board
J1 - 1 Blue-Gray from Fliptronic II Board J905-2
J1 - 2 Black-Blue from Fliptronic II Board J905-5
J1 - 3 Orange from Fliptronic II Board J905-6
J1 - 4 N/C
J1 - 5 N/C
J1 - 6 Gray-Yellow from Fliptronic II Board J904-2
J1 - 7 Gray-Yellow from Fliptronic II Board J904-2

Right Side Flipper Cabinet Opto Switch Board
J1 - 1 Blue-Violet from Fliptronic II Board J905-1
J1 - 2 Black-Yellow from Fliptronic II Board J905-3
J1 - 3 Orange from Fliptronic II Board J905-6
J1 - 4 Orange from Left Side Flipper Cabinet Opto Switch Brd J1-3
J1 - 5 N/C
J1 - 6 N/C
J1 - 7 Gray-Yellow from Left Side Flipper Cabinet Opto Switch Brd J1-6

A-12697-1
Power Driver Board


J112
J111
J110
J109
J108
J106
J107
J104
J105
J103
J102
J101
J113
J114
J115
J116
J118
J120
J123
J124
J125
J127
J130
J133
J134
J137
J117
J119
J121
J122
J126
J128
J129
J131
J132
J135
J136
J138

J101 - 1	Red (9VAC) from xformer secondary
J101 - 2	Red (9VAC) from xformer secondary
J101 - 3	N/C
J101 - 4	Blue-White (13VAC) from xformer secondary
J101 - 5	Blue-White(13VAC) loop from J101-4
J101 - 6	Blue-White (13VAC) from xformer secondary
J101 - 7	Blue-White (13VAC) loop from J101-6
J102 - 1	White-Red (16VAC) loop from J102-2
J102 - 2	White-Red (16VAC) from xformer secondary
J102 - 3	White-Red (16VAC) loop from J102-4
J102 - 4	White-Red (16VAC) from xformer secondary
J102 - 5	Black-Yellow (16VAC) loop from J102-6
J102 - 6	Black-Yellow (16VAC) from xformer secondary
J102 - 7	N/C
J102 - 8	Black-Yellow (16VAC) loop from J102-9
J102 - 9	Black-Yellow (16VAC) from xformer secondary
J103 - 1	Black (ground) to High Current Driver board J1-1
J103 - 2	N/C
J103 - 3	N/C
J103 - 4	N/C
J104 - 1	White-Blue (50VAC) to Fliptronic II Board J901-3
J104 - 2	White-Blue (50VAC) to Fliptronic II Board J901-1
J104 - 3	N/C
J104 - 4	N/C
J104 - 5	N/C
J105 - 1	N/C
J105 - 2	N/C
J105 - 3	N/C
J105 - 4	N/C
J105 - 5	N/C
J106 - 1	N/C
J106 - 2	N/C
J106 - 3	N/C
J106 - 4	N/C
J106 - 5	Red-White (+20V) to backbox flashlamps
J107 - 1	Violet-Green (+50V) to coils
J107 - 2	Violet-Orange (+50V) to coils
J107 - 3	Violet-Yellow (+50V) to coils
J107 - 4	N/C
J107 - 5	N/C
J107 - 6	Red-White (+20V) to playfield
J108 - 1	N/C
J108 - 2	N/C
J108 - 3	N/C
J109 - 1	N/C
J109 - 2	N/C
J109 - 3	N/C
J109 - 4	N/C
J109 - 5	N/C
J109 - 6	N/C
J109 - 7	N/C

Power Driver Board
Interboard Wiring

J110 - 1 N/C
J110 - 2 N/C
J110 - 3 N/C
J110 - 4 N/C
J110 - 5 N/C
J110 - 6 N/C
J110 - 7 N/C
J110 - 8 N/C
J110 - 9 N/C

J111 - 1 N/C
J111 - 2 N/C
J111 - 3 N/C
J111 - 4 N/C
J111 - 5 N/C

J112 - 1 White-Green (9.8VAC) from xformer secondary
J112 - 2 White-Green (9.8VAC) loop from J112-1
J112 - 3 White-Green (9.8VAC) from xformer secondary
J112 - 4 N/C
J112 - 5 White-Green (9.8VAC) loop from J112-3

J113, 34-pin Ribbon Cable (data) To/from CPU J211

J114 - 1 Gray-Green (+12V) to J210-6,7; J904-2
J114 - 2 Gray-Green (+12V) to J210-6,7; J904-2
J114 - 3 Gray (+5V) to J210-4,5; J502-1,3; J904-1
J114 - 4 Gray (+5V) to J210-4,5; J502-1,3; J904-1
J114 - 5 Black (Grd) to J210-1,3; J502-4,5; J904-4,5
J114 - 6 N/C
J114 - 7 Black (Grd) to J210-1,3, J502-4,5; J904-4,5

J115 - 1 Yellow-White (6.8VAC) from xformer secondary
J115 - 2 White-Brown (6.8VAC) from xformer secondary
J115 - 3 White-Brown (6.8VAC) from xformer secondary
J115 - 4 White-Orange (6.8VAC) from xformer secondary
J115 - 5 White-Yellow (6.8VAC) from xformer secondary
J115 - 6 White-Yellow (6.8VAC) from xformer secondary
J115 - 7 Orange (6.8VAC) from xformer secondary
J115 - 8 Orange (6.8VAC) from xformer secondary
J115 - 9 N/C
J115 - 10 Green (6.8VAC) from xformer secondary
J115 - 11 Brown (6.8VAC) from xformer secondary
J115 - 12 Brown (6.8VAC) from xformer secondary

J116 - 1 N/C
J116 - 2 Gray-Yellow (+12V) to Coin Door J2-4
J116 - 3 Black (Grd) to Coin Door J2-5
J116 - 4 N/C

J117 - 1 N/C
J117 - 2 Gray-Yellow (+12V) to Dot Matrix Controller J606-7
J117 - 3 Black (Grd) to Dot Matrix Controller J606-3
J117 - 4 Gray (+5V) to Dot Matrix Controller J606-5

J119 - 1 White-Violet (6.8VAC) G.I. to Coin Door Brd J2-2
J119 - 2 N/C
J119 - 3 Violet (return) G.I. to Coin Door Brd J2-1

J118 - 1 N/C
J118 - 2 Gray-Yellow (+12V) to 24-Opto Brd J3-5; 10 Sw. Opto Brd J3-2
J118 - 3 Black (ground) to 24-Opto Brd J3-4; 10 Sw. Opto Brd J3-1
J118 - 4 N/C

J120 - 1 Brown (return) G.I. to backbox
J120 - 2 Orange (return) G.I. to backbox
J120 - 3 Yellow (return) G.I. to backbox
J120 - 4 N/C
J120 - 5 Green (return) G.I. to backbox
J120 - 6 Violet (return) G.I. to backbox
J120 - 7 White-Brown (6.8VAC) G.I. to backbox
J120 - 8 White-Orange (6.8VAC) G.I. to backbox
J120 - 9 White-Yellow (6.8VAC) G.I. to backbox
J120 -10 White-Green (6.8VAC) G.I. to backbox
J120 - 11 White-Violet (6.8VAC) G.I. to backbox

J121 - 1 Brown (return) G.I. to playfield
J121 - 2 Orange (return) G.I. to playfield
J121 - 3 Yellow (return) G.I. to playfield
J121 - 4 N/C
J121 - 5 N/C
J121 - 6 N/C
J121 - 7 White-Brown (6.8VAC) G.I. to playfield
J121 - 8 White-Orange (6.8VAC) G.I. to playfield
J121 - 9 White-Yellow (6.8VAC) G.I. to playfield
J121 - 10 N/C
J121 - 11 N/C

J122 - 1 Blue-Brown (sol. 25 drive) to playfield coil
J122 - 2 N/C
J122 - 3 Blue-Orange (sol. 27 drive) to playfield coil
J122 - 4 Blue-Yellow (sol. 28 drive) to playfield coil
J122 - 5 Violet-Green (sol. 25 tieback diode) to playfield coil
J122 - 6 N/C
J122 - 7 N/C
J122 - 8 Violet-Green (sol. 27 tieback diode) to playfield coil
J122 - 9 N/C

J123 - 1 N/C
J123 - 2 N/C
J123 - 3 N/C
J123 - 4 N/C
J123 - 5 N/C

J124 - 1 N/C
J124 - 2 N/C
J124 - 3 N/C
J124 - 4 N/C
J124 - 5 N/C

J125 - 1 Black-Brown (sol.17 drive) to backbox flashlamp
J125 - 2 Black-Red (sol. 18 drive) to backbox flashlamp
J125 - 3 Black-Orange (sol. 19 drive) to backbox flashlamp
J125 - 4 N/C
J125 - 5 Black-Yellow (sol. 20 drive) to backbox flashlamp
J125 - 6 Blue- Green (sol. 21 drive) to backbox flashlamp
J125 - 7 Blue-Black (sol. 22 drive) to backbox flashlamp
J125 - 8 Blue-Violet (sol 23 drive) to backbox flashlamp
J125 - 9 Blue-Gray (sol 24 drive) to backbox flashlamp

Power Driver Board Interboard Wiring Continued...

J126 - 1	Black-Brown (sol 17 drive) to playfield flashlamps
J126 - 2	Black-Red (sol 18 drive) to playfield flashlamps
J126 - 3	Black-Orange (sol 19 drive) to playfield flashlamps
J126 - 4	Black-Yellow (sol. 20 drive) to playfield flashlamps
J126 - 5	Blue-Green (sol. 21 drive) to playfield flashlamps
J126 - 6	Blue-Black (sol. 22 drive) to playfield flashlamps
J126 - 7	Blue-Violet (sol. 23 drive) to playfield flashlamps
J126 - 8	Blue-Gray (sol. 24 drive) to playfield flashlamps
J126 - 9	N/C
J126 - 10	N/C
J126 - 11	N/C
J126 - 12	N/C
J126 - 13	N/C

J127 - 1	Brown-Black (sol. 9 drive) to playfield coil
J127 - 2	N/C
J127 - 3	Brown-Red (sol. 10 drive) to playfield coil
J127 - 4	Brown-Orange (sol. 11 drive) to playfield coil
J127 - 5	Brown-Yellow (sol 12 drive) to playfield coil
J127 - 6	Brown-Green (sol. 13 drive) to playfield coil
J127 - 7	Brown-Blue (sol. 14 drive) to playfield coil
J127 - 8	Brown-Violet (sol. 15 drive) to playfield coil
J127 - 9	Brown-Gray (sol. 16 drive) to playfield coil

J128 - 1	N/C
J128 - 2	Blue-Red (sol. 26 drive) to Speaker Panel flashlamps
J128 - 3	N/C
J128 - 4	N/C
J128 - 5	N/C

J129 - 1	N/C
J129 - 2	N/C
J129 - 3	N/C
J129 - 4	N/C
J129 - 5	N/C

J130 - 1	Violet-Brown (sol. 1 drive) to playfield coil
J130 - 2	Violet-Red (sol. 2 drive) to playfield coil
J130 - 3	N/C
J130 - 4	Violet-Orange (sol. 3 drive) to playfield coil
J130 - 5	Violet-Yellow (sol.4 drive) to playfield coil
J130 - 6	Violet-Green (sol. 5 drive) to playfield coil
J130 - 7	Violet-Blue (sol. 6 drive) to playfield coil
J130 - 8	Violet-Black (sol. 7 drive) to playfield coil
J130 - 9	Violet-Gray (sol 8 drive) to playfield coil

J131 - 1	N/C
J131 - 2	N/C
J131 - 3	N/C
J131 - 4	N/C
J131 - 5	N/C

J132 - 1	N/C
J132 - 2	N/C
J132 - 3	N/C
J132 - 4	N/C
J132 - 5	N/C

J133 - 1	Red-Brown (lamp row 1) to playfield lamps
J133 - 2	Red-Black (lamp row 2) to playfield lamps
J133 - 3	N/C
J133 - 4	Red-Orange (lamp row 3) to playfield lamps
J133 - 5	Red-Yellow (lamp row 4) to playfield lamps
J133 - 6	Red-Green (lamp row 5) to playfield lamps
J133 - 7	Red-Blue (lamp row 6) to playfield lamps
J133 - 8	Red-Violet (lamp row 7) to playfield lamps
J133 - 9	Red-Gray (lamp row 8) to playfield lamps

J134 - 1	N/C
J134 - 2	N/C
J134 - 3	N/C
J134 - 4	N/C
J134 - 5	N/C
J134 - 6	N/C
J134 - 7	N/C
J134 - 8	N/C
J134 - 9	Red-Gray (lamp row 8) to coin door

J135 - 1	N/C
J135 - 2	N/C
J135 - 3	N/C
J135 - 4	N/C
J135 - 5	N/C
J135 - 6	N/C
J135 - 7	N/C
J135 - 8	N/C
J135 - 9	N/C

J136 - 1	N/C
J136 - 2	N/C
J136 - 3	Yellow-Gray (lamp column 8) to coin door

J137 - 1	Yellow-Brown (lamp column 1) to playfield lamps
J137 - 2	Yellow-Red (lamp column 2) to playfield lamps
J137 - 3	Yellow-Orange (lamp column 3) to playfield lamps
J137 - 4	Yellow-Black (lamp column 4) to playfield lamps
J137 - 5	Yellow-Green (lamp column 5) to playfield lamps
J137 - 6	Yellow-Blue (lamp column 6) to playfield lamps
J137 - 7	Yellow-Violet (lamp column 7) to playfield lamps
J137 - 8	N/C
J137 - 9	Yellow-Gray (lamp column 8) to playfield lamps

J138 - 1	N/C
J138 - 2	N/C
J138 - 3	N/C
J138 - 4	N/C
J138 - 5	N/C
J138 - 6	N/C
J138 - 7	N/C
J138 - 8	N/C
J138 - 9	N/C

NOTES

LAMPS

Lamp Matrix

Red
1
Yellow (B+)

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
1 Red-Brown J133-1 Q90	Not Used 11	Coffin Lock 1 21	R. Lane: Video "V" 31	Right Return 41	Coffin Lamp 1 51	Left Skill 100K 61	Dracula "C" 71	Rats Mode 81
2 Red-Black J133-2 Q89	Not Used 12	Coffin Lock 2 22	R. Lane: Video "I" 32	Right Drain 42	Coffin Lamp 2 52	M. Skill 1 Million 62	Dracula "L" 72	Dracula "A" 82
3 Red-Orange J133-4 Q88	Not Used 13	Dracula "A" 23	R. Lane: Video "D" 33	Coffin Multiball 43	Magnet 53	R. Skill 100K 63	Left 3-bank Top 73	T.L. Hole: Mystery 83
4 Red-Yellow J133-5 Q87	Not Used 14	R. Ramp: 0.5 Million 24	R. Lane: Video "E" 34	Playfield 2X 44	Shoot Again 54	Top 3-lane Left 64	Left 3-bank Middle 74	T.L. Hole: Carriage 84
5 Red-Green J133-6 Q86	Not Used 15	R. Ramp: 1 Million 25	R. Lane: Video "O" 35	Castle Multiball 45	Love Never Dies 55	Top 3-lane Middle 65	Left 3-bank Bottom 75	T.L. Hole: Ex-ball 85
6 Red-Blue J133-7 Q85	R. Ramp Lock 16	R. Ramp: 2.5 Million 26	Dracula "R" 36	Playfield 3X 46	Coffin Lamp 3 56	Top 3-lane Right 66	Middle 3-bank Left 76	T.L. Hole: Jackpot 86
7 Red-Violet J133-8 Q84	Dracula Face 17	R. Ramp: Double 27	Left Drain 37	Mist Multiball 47	L. Ramp Enter 57	Dracula "U" 67	Middle 3-bank Middle 77	Launch Ball 87
8 Red-Gray J133-9 Q83	R. Ramp: 2 Million 18	R. Ramp: 1.5 Million 28	Left Return 38	Dracula "D" 48	L. Ramp Lock 58	Jet Insert 68	Middle 3-bank Right 78	Game Start 88

SWITCHES

Switch Matrix

White
Green

Dedicated Grounded Switches
Orange-Brown J205-1 Left Coin Chute D1
Orange-Red J205-2 Center Coin Chute D2
Orange-Black J205-3 Right Coin Chute D3
Orange-Yellow J205-4 4th Coin Chute D4
Orange-Green J205-6 Normal Function Service Credits | Test Function Escape D5
Orange-Blue J205-7 Normal Function Volume Down | Test Function Down D6
Orange-Violet J205-8 Normal Function Volume Up | Test Function Up D7
Orange-Gray J205-9 Normal Function Begin Test | Test Function Enter D8

Column / Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-5 U20-15	5 Green-Black J207-6 U20-14	6 Green-Blue J207-7 U20-13	7 Green-Violet J207-8 U20-12	8 Green-Gray J207-9 U20-11
1 White-Brown J209-1 U18-11	Not Used 11	Slam Tilt 21	Under Shooter Ramp 31	Trough 1 Ball 41	Opto T.R. Lane 51	Left Jet 61	Opto Castle Popper 71	Magnet Left 81
2 White-Red J209-2 U18-6	Not Used 12	Coin Door Closed 22	Not Used 32	Trough 2 Balls 42	Opto Magnet L. Pocket 52	Right Jet 62	Opto Coffin Popper 72	Ball On Magnet 82
3 White-Orange J209-3 U18-5	Start Button 13	Ticket Opto 23	Not Used 33	Trough 3 Balls 43	Opto Castle 1 53	Bottom Jet 63	Opto L. Ramp Entry 73	Magnet Right 83
4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Launch Ball 34	Trough 4 Balls 44	Opto Castle 2 54	Left Sling 64	Not Used 74	L. Ramp Score 84
5 White-Green J209-5 U19-11	L. Drop Target 15	Top 3-lane Left 25	Left Drain 35	Not Used 45	Opto Wire Ramp Popper 55	Right Sling 65	Not Used 75	L. Ramp Diverted 85
6 White-Blue J209-7 U19-6	L. Drop Score 16	Top 3-Lane Middle 26	Left Return 36	Not Used 46	Opto Crypt Popper 56	Left 3-bank Top 66	Not Used 76	Middle 3-bank Left 86
7 White-Violet J209-8 U19-5	Shooter Lane 17	Top 3-lane Right 27	Right Return 37	Not Used 47	Opto Castle 3 57	Left 3-bank Middle 67	R. Ramp Up 77	Middle 3-bank Middle 87
8 White-Gray J209-9 U19-7	Not Used 18	R. Ramp Score 28	Right Drain 38	Outhole 48	Mystery Hole 58	Left 3-Bank Bottom 68	Not Used 78	Middle 3-bank Right 88

Flipper Grounded Switches
Black-Green J906-1 Lower Right E.O.S. Switch F1
Blue-Violet J905-1 Lower Right Flipper Button F2
Black-Blue J906-3 Lower Left E.O.S. Switch F3
Blue-Gray J905-2 Lower Left Flipper Button F4
Black-Violet J906-4 Upper Right E.O.S. Switch F5
Black-Yellow J905-3 Upper Right Flipper Button F6
Black-Gray J906-5 Upper Left E.O.S. Switch F7
Black-Blue J905-5 Upper Left Flipper Button F8

WARNINGS & NOTICES

WARNING

FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended. Use of Non-WILLIAMS parts or modifications of game circuitry, may adversely affect game play, or may cause injuries.

SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS may void FCC Type Acceptance.

BECAUSE THIS GAME IS PROTECTED by Federal copyright, trademark, and patent laws, unauthorized game conversions may be illegal under Federal law.

THIS 'CONVERSION' PRINCIPLE ALSO APPLIES to unauthorized facsimiles of WILLIAMS equipment, logos, designs, publications, assemblies, and games (or game feature not deemed to be public domain), whether manufactured with WILLIAMS components or not.

NOTICE

WILLIAMS, Lane-change and Multi-ball are trademarks of WILLIAMS ELECTRONICS GAMES, INC.
Entire contents of this manual © 1993 WILLIAMS ELECTRONICS GAMES, INC.

WARNING

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generated, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Interference Notice

CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

FCC STICKER. Check the back of your game to verify that an FCC-certification sticker was attached to your game at the factory. All games that leave the WILLIAMS plant have been tested and found to comply with FCC Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor may result, if the sticker is missing. If you receive a game, manufactured after December 1982, that has no FCC sticker, call WILLIAMS for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

© 1992 Columbia Pictures Industries, Inc.
All Rights Reserved.

Theme Music:
© 1992 Burbank Plaza Music, Inc.
(Composer: Wojciech Kilar)
Used by Permission - All Rights reserved

⚠ CAUTION **Transport this game ONLY with hinged backbox DOWN!**

FOR SERVICE... CALL your authorized WILLIAMS Distributor.